AMIGA WORLD

February 1988
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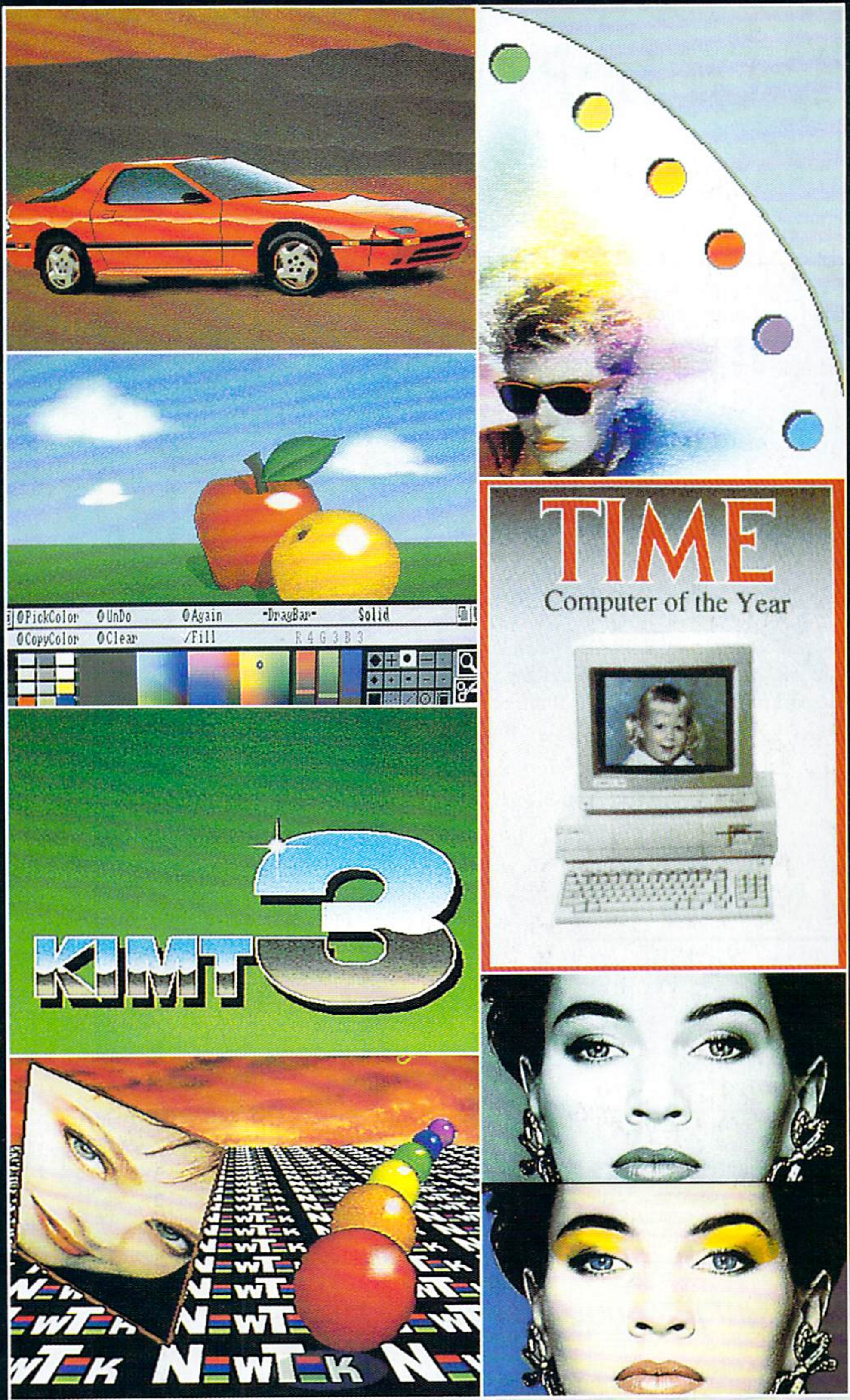
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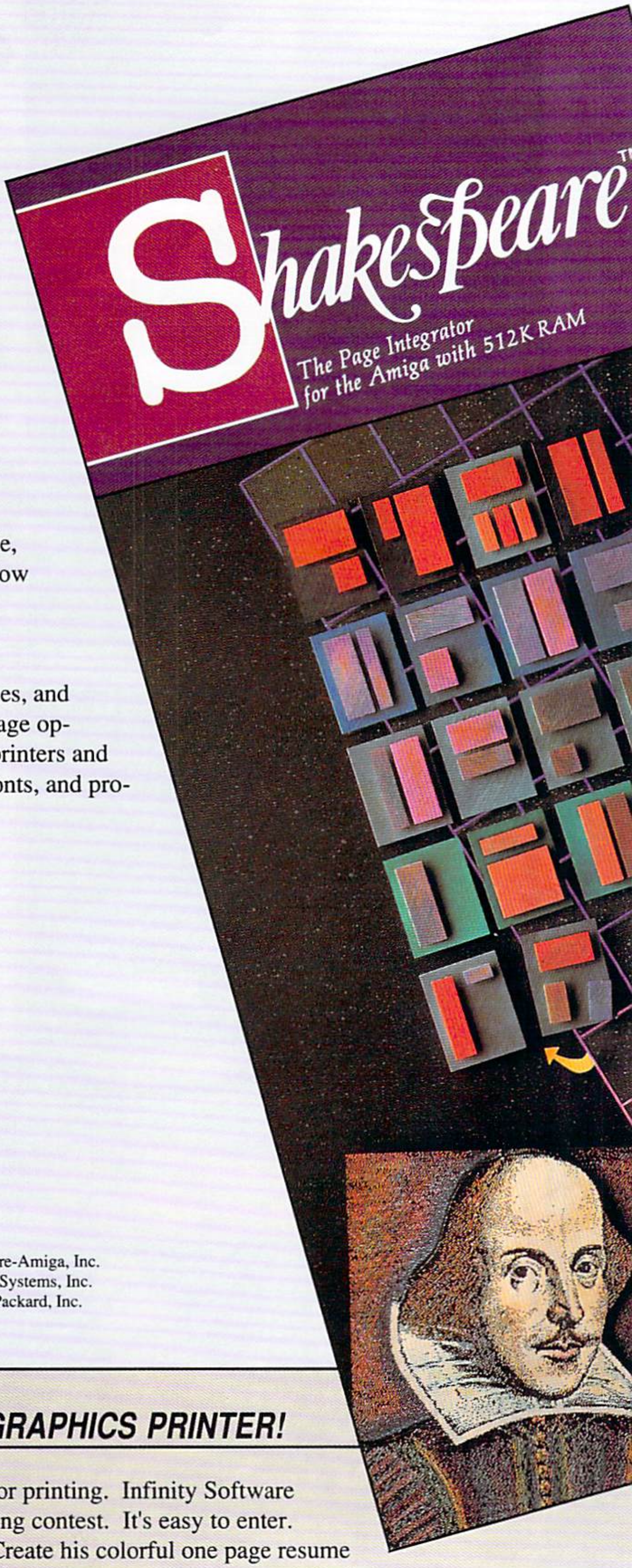
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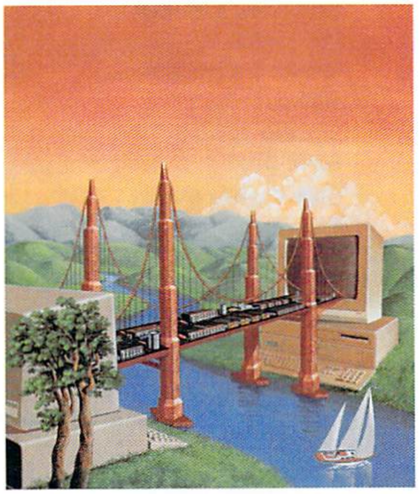


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VOLUME 4, NUMBER 2 FEBRUARY 1988

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Making connections to other worlds might be a good handle for this month's theme—at least other computing worlds. . . Bridging the long-standing gap between the Amiga and the IBM PC. . . Within the Commodore realm, moving between C-64/C-128 and Amiga. . . Getting beyond the standard 68000 microprocessor to new heights of speed and performance. The Amiga is definitely not a one-box world.

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COVER PAINTING BY ISADORE SELTZER

AmigaWorld (ISSN 0883-2390) is an independent journal not connected with Commodore Business Machines, Inc. *AmigaWorld* is published monthly by CW Communications/Peterborough, Inc., 80 Elm St., Peterborough, NH 03458. U.S. subscription rate is $24.97, one year. Canada $47.97 (Canadian funds), one year only. Mexico $29.97 (U.S. funds drawn on U.S. bank), one year only. Foreign $44.97 (U.S. funds drawn on U.S. bank), one year only. Foreign Airmail, please inquire. Second class postage paid at Peterborough, NH, and at additional mailing offices. Phone: 603-924-9471. Entire contents copyright 1987 by CW Communications/Peterborough, Inc. No part of this publication may be printed or otherwise reproduced without written permission from the publisher. **Postmaster:** Send address changes to *AmigaWorld*, Subscription Services, PO Box 868, Farmingdale, NY 11735. Nationally distributed by International Circulation Distributors. *AmigaWorld* makes every effort to assure the accuracy of articles, listings and circuits published in the magazine. *AmigaWorld* assumes no responsibility for damages due to errors or omissions.


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ZEITGEIST

"Who do I talk to about the great job you guys are doing?"

I'VE BEEN TO a number of shows in the past month or two (AmiExpo, Northeast Computer Faire, Comdex) and it was good to see the excitement, meet some of you readers in person, shoot a few pictures, see some new products, talk to some of the advertisers and get out of New Hampshire for a few days. AmiExpo was a madhouse, Northeast Computer Faire was a morgue, and Comdex was more business oriented. When you stand around the booth or just wander around the exhibit floor, people come up and talk, ask questions, make suggestions, criticize, compliment, etc. I got a lot of similar comments and questions that you probably would have asked if you saw me. Since everyone didn't go to these shows I thought I would re-create the experience for you.

Here I am standing at the *AmigaWorld* booth. Tall, thin, fuzzy hair, beard (I grew back my beard since the last photo printed in Zeitgeist). Most of you don't recognize me except those who see me at various shows and events. You almost walk past the booth but then notice the blow-up of one of our covers on the wall and the piles of *AmigaWorlds* on the counters.

"Oh. . *AmigaWorld*," you say.

At this point there are usually two sorts of scenarios:

A. You turn to your friend or your friend turns to you or you mutter to no one in particular as you flip casually through a copy of the magazine. "I used to subscribe, but there isn't anything worth reading in *AmigaWorld*. All fluff. ________ magazine has better stuff." (Fill in the blank.) At that point you usually wander off not really wishing to confront anyone at the booth directly. If you do hang around, the questions are usually something like:

"Commodore owns you guys, right?" or "How come you never say anything negative about a product?" or "Why don't you guys do more technical stuff and/or program listings?"

No, Commodore doesn't own *AmigaWorld*. They don't come close to supporting us (the total number of ads Commodore placed in *AmigaWorld* in 1987 was two). They don't really trust us. How much inside information we get from Commodore depends on who is currently in charge. Sometimes they tell us what is going on and sometimes we are last on the list. We don't have developer status and aren't invited to developer conferences on a regular basis. We don't say a lot of negative things about Commodore because it would serve no purpose. We don't say a lot of negative things about the Amiga because we like the Amiga and it would be self defeating. We want the Amiga to succeed as much as Commodore does. We *do* say negative things about products that are bad no matter who manufactures them or how many ads they take out.

As far as our technical coverage goes, we don't do hardware projects or Forth or Modula II—there just aren't enough people interested (when we get our first thousand letters about any of these we will start running articles on them; until then all our surveys indicate we are at just the right level).

I don't think we will ever fill the pages of *AmigaWorld* with program listings. I don't think that is what the majority of the readers want. (If it IS what you want, then let me know.) Nothing is set in stone and we try to give you what you want.

The other group of people who come up to the booth to talk usually say something like:

"*AmigaWorld*. You guys are doing a great job. The magazine has gotten a lot better recently. I like the Hors d'ouevres/ Reviews/ features/ Zeitgeist/ Call for Authors/ buyer's guides/ comparative reviews (whatever). Keep up the good work, and when are you going to do a story on word processors/ desktop-publishing packages/ music/ video/ Basic programming. . . ."

"We will be doing stories, and entire issues, on all of these topics in '88."

"Glad to see you guys are finally going monthly. Does that mean my subscription is going to run out sooner?"

"Yes. Your original subscription was for six issues. You will still get those six issues, it will just take half the time."

And then we get reactions from people who advertise in the magazine:

"Thanks for the review in your ________ issue."

"Why didn't we get a review in the ________ issue?"

"We strongly disagree with your review of our product in the ________ issue."

"Our product should be shipping in about a week/ month/ few months/ spring/ as soon as the manual is printed. Who do we send it to?"

"Barbara Gefvert. Review Editor."

"Who do I talk to about the great job you guys are doing?"

"Me. Guy Wright. I'm the Editor-in-Chief."

"YOU are Guy Wright? Don't you write Zeitgeist or something?"

"And Call for Authors, and some reviews, and stories, and I put together Hors d'oeuvres. Yes, I'm Guy Wright."

"I really liked your editorial a few issues back."

"Thanks."

"You have a great magazine."

"Thanks. We have fun doing it and I think it shows."

"Well, nice to meet you."

"You too."

Guy Wright


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Actual Amiga Screens

REPARTEE

Comments, complaints and concerns

from AmigaWorld *readers.*

Defunct Deal

IN THE NOV. '87 Notepad ("Random Access," p. 10), you reported that Commodore was not giving any deals on an upgrade from the 1000 to the 2000. My local dealer said Commodore was offering $1,000 off the Amiga 2000 for those who traded in their Amiga 1000. So, I traded in my 1000 and received a 2000 for $1,000. I don't know if this offer is available everywhere, but I see all the Amiga dealers in Michigan are giving the same deal.

Doug Krueger
Walled Lake, MI

We weren't aware of this trade-in policy at the time we went to press with the November issue. We received several letters from people around the country who got the same deal. It was called the "1000 + $1000 = 2000" program: all you had to do was bring in your A1000 system to your authorized Amiga dealer and you would be given $1,000 credit toward your purchase of the Amiga 2000. Unfortunately, this offer expired on November 30, 1987.

—Editors

A Vote for the 1000

LET ME CAST my vote in the dispute over the new Amigas. I just bought a new Amiga, upgrading from a C-128. Knowing full well what I was doing, I chose the Amiga 1000 over both the 500 and the 2000.

The 1000 has proven itself and is well supported by third-party developers. It is fully expandable up to eight megabytes and its operating system isn't locked up in ROM. The 2000 is extremely over-priced: You could get an expanded 1000 *and* an IBM compatible for that kind of money! Due to the 500's problem with complex graphics (when expanded with the A501 card), not to mention its wimpy external power supply, I instantly ruled out that machine.

All in all, I feel the new Amigas are a positive step in support of the 1000's continued success, and I hope they do well. However, for my money, I chose the 1000.

John Megehee
Tulsa, OK

Dream Machine

I AM SOMEWHAT astounded by my fellow Amiga owners' reactions to the 500 and 2000. Upgrades and redesigns are the order of the day in this industry. Witness the changes in the Macintosh world (128, 512, 512E, Mac+, SE, Mac II) in the few years of its existence.

Anyone who buys any digital equipment will see it eclipsed at a lower price within months. This is cause for celebration, not wrath. Were such change not so, I would be diddling front panel switches to input hex on a very expensive homebrew 4K 8-bit while hoping that the oscillators in the huge monophonic synth would remain stable long enough to record one track in real-time—that is if I could even afford such a setup. Thanks to this ongoing change, a machine that was the substance of dreams only a few years ago is now available for an undreamed of price.

Larry N. Bolch
Anchorage, AK

Lost on the Upgrade Path

I AM A C-128 owner who intends to upgrade to the Amiga. Would you please review The 64 Emulator from ReadySoft and the 64 Bus from Dynamic Software Technologies as soon as possible. Being able to use the same software and peripherals on an Amiga that I now use on my C-128 sound like a great opportunity. This would allow me to purchase an Amiga a lot sooner, because I would not have to buy a lot of Amiga software and peripherals until a later date.

Wayne Warner
Springfield, OR

I HAVE A problem with one of your advertisers. ReadySoft Inc. has a product called The 64 Emulator. I purchased one along with the interface. This product is a rip-off!

Of more than 30 programs I have tried to load on the Amiga using the 1541 drive and interface, only about six or seven finished loading. (Some of the programs had copy protection and some did not.)

Of the few programs that did load, all were unusable due to screen distortion or drastic reductions in speed. There may be a C-64 program that will work with The 64 Emulator, but I haven't found it.

Upon telling my complaints to ReadySoft, their answer was "Sorry, all sales are final."

I am aware that you are not responsible for products advertised in your magazine, but I thought that you should be aware of how bad this product is.

Greg Brady
Pascagoula, MS

These products (and others) are reviewed in this issue. See Guy Wright's article "You Can't Get There From Here," p. 34, which discusses possibilities for upgrading from the C-64/C-128 to the Amiga. We highly recommend that you read this article before making any buying decisions. (By the way, the 64 Bus is now called Access-64 and is marketed by Progressive Peripherals Inc.)

—Editors

Send your letters to: Repartee, *AmigaWorld* editorial, 80 Elm St., Peterborough, NH 03458. Letters may be edited for space and clarity. ■


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NOTEPAD

Edited by Linda Barrett

Club Commodore's New Act

FRANK SINATRA AND Sammy Davis Jr., Sigfried and Roy, Max Toy and Amiga were the names that lit up the Las Vegas sky last November at COMDEX time. While the others played the big-name casinos, CEO Max Toy and the Amiga staged their act for the exclusive afternoon crowd at Club Commodore.

Obviously no stranger to sales performance, as he's fresh from successful gigs with Compac and IBM, Toy thrilled the hundreds of Amiga dealers and sales reps with his monologue. He did have good material, grabbing the audience from the first with the flashy Amiga Test Flight video backed by talk of Commodore's new profitability. According to Toy, the company introduces more people to computers than any other hardware manufacturer; as proof he called on their installed-base of 10 to 12 million users worldwide. A fountain of figures, Toy then claimed that while the Macintosh had some 250 software titles two years into its life, the Amiga in the same interval had over 800. (*AmigaWorld*'s December '87 Buyer's Guide weighed in at 665 titles, but perhaps 135 have been introduced since then.)



Commodore's crowded Comdex booth.

Apparently saving some hot material for his next act, Toy declined to provide details on forthcoming Commodore products, disclosing only that several are in the works: an AT-compatible bridge card, a 68020 board and a genlock for the A2000, as well as a hi-res monitor. He did admit that Commodore underestimated the demand for Amiga 500s and 2000s, fielding questions about availability. At the close of his routine, Toy invited the audience to wander through the floor show next door, where the hall was full of developers demonstrating their wares for interested dealers and sales reps.

The mood was decidedly upbeat (partially owing to the complimentary drinks and hors d'oeuvres at the end of the day), and Max Toy's act received rave reviews. The highlight of the day was watching the fast-talking CEO steal the microphone (not to mention the show) from Commodore veterans Frank Leonardi and Rich McIntyre. While I couldn't help wondering if he was getting paid by the word, Toy and the Amiga should have a long run together.

—Peggy Herrington

Beyond the Three-Piece Suits

COMDEX IS USUALLY a show dominated by three-piece attired IBMers and a few hundred high-end peripheral manufacturers. While there is a lot going on, anyone interested in Commodore and the Amiga can cover the show in about one day. Fall '87 Comdex wasn't much different than previous shows—except for the Commodore booth. As if Commodore's even being there wasn't different enough, their booth was completely devoted to the Amiga.

According to Commodore representatives the booth's official theme was "Only Amiga Makes it Possible." For most of the show attendees who wandered by the large, always crowded display of Amiga software and hardware, the theme was closer to "Rediscovering the Amiga." People knew about the Amiga's capabilities, but they were astounded all over again by the demonstrations going on at the booth.

Commodore shared their booth with third-party developers, arranged in sections, each designed to show off an aspect of the Amiga, but the individual pieces of hardware and software weren't the show stoppers. It was the interrelation of that hardware and software that was making people slow down and gape. A video frame buffer captures images and saves them in IFF format for a paint program to modify, a digitizer works with the paint program which works with an animation program which works with a genlock. Other computers can perform these separate operations, but cannot integrate the results.

Each individual product was impressive but the total effect of the Commodore booth was stunning. People were walking away shaking their heads saying things like: "I knew the Amiga was capable of some interesting stuff but all this is unbelievable. The Amiga sure has come a long way in just two years."

Comdex is more than crowded booths and demonstrations, however. When the hall closes, discussions move to the cocktail parties. Such was the case at the *AmigaWorld* reception at the Alexis Park Resort. A few hundred developers showed up to talk, drink and eat—mostly talk. While each developer had their particular views on the current state of Amiga affairs, all of them seemed to sense a lot of activity in the market. Commodore is promoting machines. Products that were promised months ago are actually shipping, and the blanks are filling. Manufacturers who had put their Amiga products on the back burner for a while were talking about rekindling the fires and getting back into the Amiga market. People who had products for other computers were saying that they were ready to start stepping up Amiga conversions. Even a number of Atari ST, Macintosh and MS-DOS developers were impressed by things they had seen at the Commodore booth or at the developer's conference that Commodore held earlier.

Commodore is marketing the Amiga, sales are up and hardware and peripherals are getting more professional. Since sophisticated products are thriving in the Amiga markets, there must be a user base interested in more than just playing games. Both the party and the show's moods were upbeat. Pushed by all that excitement, the Amiga product floodgates will open wider and wider.

—GW

Looking for a Few Good . . . Developers

ONCE THE DOMAIN of powerful supercomputers and superminis, professional digital image processing is now available for the Amiga in the form of the Amiga Parallel Imaging Coprocessor. Developed by the Center for Productivity Enhancement at the University of Lowell (MA), the Parallel Imaging Coprocessor is an expansion card for the Amiga 2000. Employing up to 7 uPD7281 Image Pipeline Processors (for a theoretical 35 Million Instructions Per Second), the coprocessor board, directed by a C runtime library or the University's Image Kernal System (IKS), can perform a nearly unlimited number of image processing tasks.

"Commodore shouldn't call this [the Amiga 2000] a personal computer," says Rich Miner of the Center, "it's actually a personal workstation." The Parallel Imaging Coprocessor is the first in the Center's series of image and video enhancement products.

The Parallel Imaging Processor is a hardware implementation of the IKS. The University hopes to establish IKS as a standard imaging system, providing a common set of imaging tools for different devices. When run on a host that can support its functions in hardware, it will drive the imaging device. If no hardware exists, IKS does (relatively slow) software imaging.

Plans to market the Parallel Image Coprocessor and the IKS are incomplete. "Creating a commercial product is not our primary goal," says Miner. "This project enhances the reputation of the Center while providing students with the kind of practical experience not found in a classroom." Contact Rich Miner at the Center for Productivity Enhancement, University of Lowell, One University Ave., Lowell, MA 01854. 617/452-5000 ext. 2693.

—RR

Simply Outraegis '87

AGAINST THE ROMANTIC backdrop of an ornate rococo frieze in Los Angeles' Mayfair Theater, a half dozen Amiga monitors sat in a staged flurry of pumpkins and autumn leaves. Last October OutrAegis '87 was more than a showcase for Aegis' products; it was a Who's Who gathering of the Amiga firmament. While Amigas lighted the stage with multi-colored desktop videos, the panel of Amiga luminaries perched on large felled logs—Gary Bonham (VideoTitler, coming soon), Stuart Ferguson (Modeller 3-D, Aegis' object editor), John Foust (Syndesis), Martin Hash (Animator: Apprentice), Allen Hastings (VideoScape 3-D), Jim Sachs (Defender of the Crown) and Bill Volk, Aegis Vice President of Technical Development.

There was more to look at than people and pumpkins, however. Besides their new video programs, Aegis previewed four games. "So What's the Big Deal?" by Jim, Jeremiah and Michael O'Flaherty won the OutrAegis video contest, while Allen Hastings' "Apocalypse Real Soon Now" and Jim Sachs' "20,000 Leagues Under the Sea" beseiged the limits of computer video. Richard Lewis showed how the Amiga invaded network TV on *Max Headroom*, and Cris Palomino provided a glimpse of the new show *Secrets and Mysteries of the Universe*, starring Edward Mulhare and the Amiga.

Besides the glow of demos and videos, the air was filled with speeches. During the panel discussion, the question of animation standards sparked a heated exchange. Bill Volk capped the argument, saying "If you're at all interested in animation, get on BIX, with the Amiga.Dev IFF discussion. It's a roundhouse of people screaming at each other at times, but things do get settled as far as animation standards and file formats. It's a bloody war out there on other systems, and the Amiga is an island of calm where you can actually take a painting and import it into 20 other programs. This doesn't exist anywhere else."

Commodore VP Rich McIntyre peered into the crystal ball of corporate marketing, announcing future promotional efforts would focus on desktop presentation. McIntyre predicts that by the end of '88 there will be more Amigas in the world market than the installed base of C128s.

Souvenirs were everywhere—OutrAegis T-shirts, OutrAegis pens and even an OutrAegis jack-o-lantern. While last year's accessories are collectors items, you can stock up on the hot '88 T-shirt fashions this fall.

—Ben and Jean Means



Master of 3–D, Allen Hastings.


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HORS D'OEUVRES

Hints, tips and techniques

from your fellow Amiga users.

More and More Startup Speedups

OVER THE COURSE of months of adding and deleting files on my Workbench disk, I began to realize that the loading time for my startup sequence was approaching one minute. This is because AmigaDOS scatters files throughout the disk in pieces when there is insufficient room in one place for the entire file. The way to remedy this is to use the COPY ALL command to make a backup copy of the disk. Files are copied sequentially and contiguously onto the new disk, resulting in reduced seek time during reads.

First, format the destination disk. Then from CLI, type:

COPY *source name* TO *destination name* ALL QUIET

The QUIET command is optional; it kills the display of filenames as they are copied. If you want to watch the files as they are copied, just leave off the QUIET. This is a slow process, so sit back and wait.

Using this method I was able to reduce my startup secuence time from 56 seconds to 46 seconds. As a bonus, I gained a significant reduction in the amount of time required for icons to appear in the disk's window.

I discovered one other timesaver connected with the startup sequence and was able to shave off another three seconds by simply specifying complete pathnames in every command line of my startup-sequence file. Instead of the usual:

```
RUN PopCLI
```

I used the complete pathname to tell AmigaDOS where to find each command and/or file:

```
C:RUN C:PopCLI
```

Using these two tips, I have reduced the speed of my startup by 13 seconds, an improvement of nearly 25 percent. Of course, your mileage may vary.

Cletus Baker
Council Bluffs, IA

Even More Startup Speedup

HERE IS YET another speedup for your startup-sequence on 1.2 Workbench disks. This will definitely work with a standard 512K, single or dual drive, Amiga 1000. It should also work if you have a printer and/or modem.

In the S directory of the standard Workbench 1.2 disk, you can remove the following lines marked here with an asterisk:

```
* echo"Workbench disk. Release 1.2
  version 33.47"
* echo" "
* echo"Use Preferences tool to set
  date"
* if EXISTS sys:system
  path sys:system add
* endif
* if EXISTS sys:utilities
  path sys:utilities add
* endif
* BindDrivers
Loadwb
EndCLI >nil:
```

The first, second and third lines just display messages that we all know by heart. The fourth, sixth, seventh and ninth lines involve searching for directories that are already on a standard system disk. Why search for something we know is there? The BindDrivers command involves the addition of non-standard hardware. Why try to add non-standard hardware when we know it is not there?

If you don't feel safe removing the lines from your startup sequence, then just convert them to comments, so if you ever need them, you can convert them back to executable lines.

Alan McKay
Stellarton, N.S. Canada

Editor's Note: This tip might cause problems during some operations with some disks or with some hardware add-ons, but nothing drastic. When trying either of these last two tips, remember: ALWAYS WORK WITH A BACKUP COPY, NEVER YOUR ORIGINAL WORKBENCH DISK!

Multi-Lightning Lines

TELL ALL YOUR readers to use surge suppressors on ALL wires that connect the Amiga to the outside world. During a recent thunderstorm my Amiga was killed. I had unplugged the computer, but I forgot about the modem line. Don't do as I did. Buy a $20 telephone line suppressor. It is much cheaper than a new computer.

Steve Olson
Madison, SD

Editor's Note: Even safer and cheaper, unplug EVERYTHING during a thunderstorm. Lightning can jump almost anything, even a line suppressor.

DAK Camera Update

I TOOK THE advice of J. Forman (Inexpensive Video Camera, *AmigaWorld* July/August 1987) and ordered the Magnavox Home Security camera for use with Digi-View. Unfortunately, I did not check carefully when I telephoned DAK Industries to order. I found out the hard way ►

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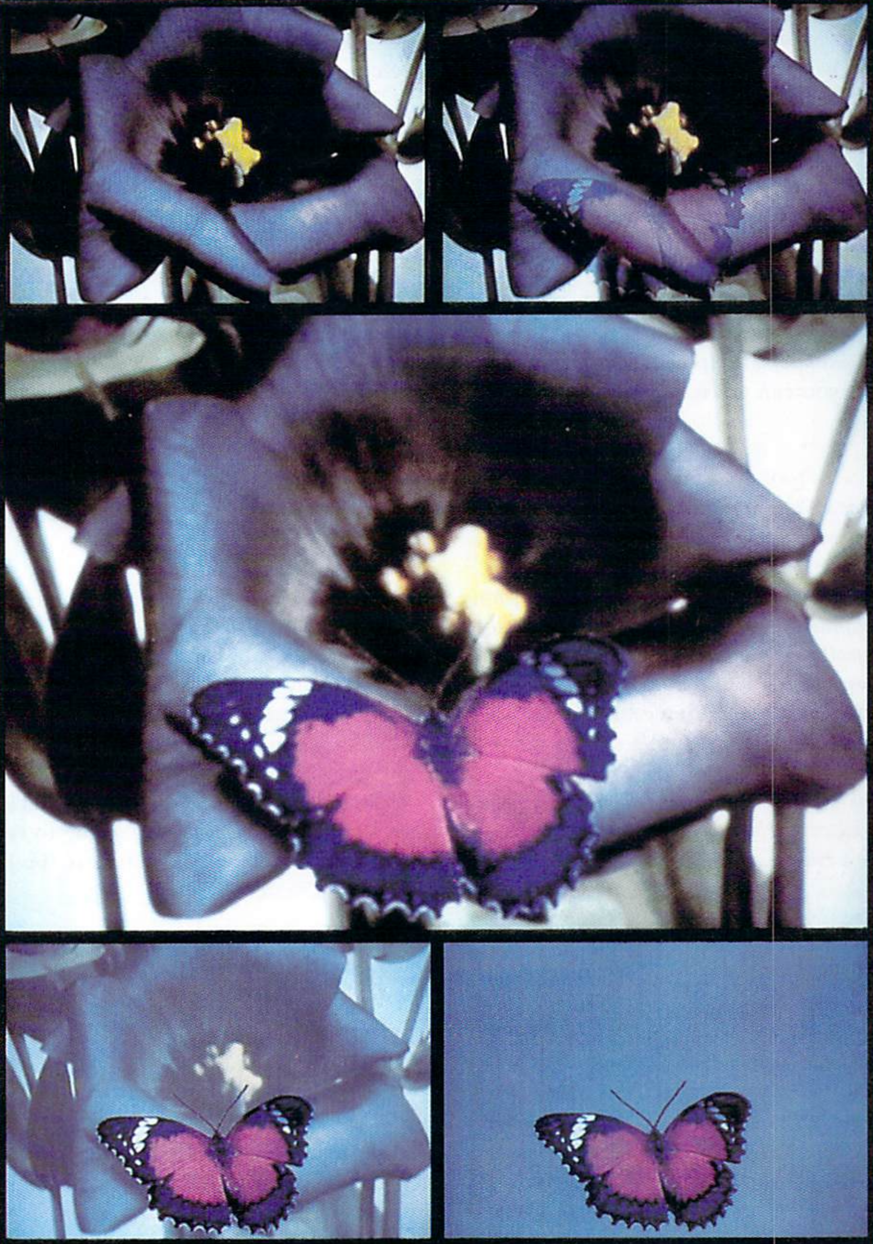
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The bottom sequence shows the Amiga background fading in.

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Sacramento, CA 95825

Digital Creations

Circle 28 on Reader Service card.

why the camera is "inexpensive." It has no power source of its own. It gets its power through the monitor which sells as a unit for $299. The camera on its own is completely useless. I now have a camera that I cannot use. If I had gone ahead and ordered the camera from NewTek as I had planned on doing before I saw this tip, I would be far better off.

The other annoying part of all this is that DAK Industries does not export their goods to Canada; therefore, I had to make a 600-mile trip to pick up the camera, which wasn't so bad as I was going on a holiday anyway. But in order to pick up the monitor (at additional cost, of course), I would have had to make a special trip of another 600 miles.

As you can guess, I am not amused.

Darlene Rogers
Courtenay, B.C. Canada

Editor's Note: We have tried to find an external power supply for the Magnavox camera but have come up empty. It is always a good idea to check carefully before you buy anything mail order (although, in this case, one would naturally assume that the camera had its own power supply). The two lessons here are: First, when ordering products through the mail, always check on their return policy (in case you have to return something you're not happy with), and second, we can't check everything submitted to Hors d'oeuvres, so use these tips with a bit of caution.

BASIC SUB SEARCH

THIS IS FOR all you Amiga Basic users who write programs over 5000 bytes long. You have probably noticed that it takes a long time to scroll through a program to find a certain block of code. Sure, you could sprinkle your programs with labels and type LIST *label name* to display the block, but if you are like me, you write subprograms instead of subroutines (subprograms can't be listed with the LIST command), and forget the labels. Fear not, there is a quick and easy way to find your way through a program without growing old.

The first step is to set up the program with the label name in a comment line. To do this, click the mouse at the beginning of the line with the label, press shift right arrow twice, and type a comment line (preceded with '). Do this for all subroutines, subprograms and any other important program lines. Just the label name is all that is needed; too much comment will slow down the display. Press ALT left arrow to return to the listing. For best results, the listing window should be opened to its fullest width and the program should be written so that no lines are wider that the listing window.

To use, press shift right arrow twice and use the shift up arrow and shift down arrow to move through the program until the label is found. Finally, press ALT left arrow to display the program code.

As an example of listing speed, an 18,500-byte program took one minute and eight seconds to list using shift down arrows, and only 13 seconds using my quick way.

Richard Bennett
Bethel, CT

KEYBOARD BUFFER UPDATE UPDATE

IN THE SEPT/OCT 1987 Hors d'oeuvres there is a keyboard buffer update giving a good, clean-cut way to clear the keyboard buffer. I would like to point out, however, that the code works fine and is smaller when only used a few times in a program. If you are going to need to clear the buffer at four or more places in a program (i.e., you are going to type the code in four or more times), the following is better:

```
SUB ClrBuf STATIC
  WHILE INKEY$>"" : WEND
END SUB
```

You would call this ClearBuffer routine from your program with this line:

```
Clrbuf
```

Believe me, it works. Besides using less memory for four or more instances of Clearbuffer code, this code keeps in the spirit of using subprograms to keep programs from being archaic.

Gregory Kendall
Woodstock, GA

1.1 TO 1.2 MADE EASIER

IN THE JULY/AUGUST 1987 Hors d'oeuvres, Brian Whitworth describes how to change a Version 1.1 disk to a formatted 1.2 disk and install it. This does allow for faster file access, but it's still a 1.1 disk. To take advantage of the RAMdisk icon and the other improvements of 1.2, you need the new libraries and devices. Use ED to create this file:

```
COPY DF0:libs TO DF1:libs ALL
COPY DF0:l TO DF1:l ALL
COPY DF0:devs/#?.device to DF1:devs
```

Save this file to your Workbench 1.2 disk with a name like CONVERT1.2. Typing EXECUTE CONVERT1.2 will change any disk in DF1:. Some old software may not work with the new libraries. Work on backups only!

David Cox
Flint, MI

CLI OR WORKBENCH? PROMPT

I HAVE A general-purpose Workbench disk from which I sometimes load Workbench and other times go directly to CLI. To simplify the process, I put the following commands at the end of my startup-sequence file:

```
.
.
.
ECHO "Load Workbench? Y <return>
  or <return>"
FAILAT 25
MAKEDIR > NIL: ?
FAILAT 10
IF EXISTS y THEN
DELETE y
LOADWB
ENDCLI > NIL:
ENDIF
```

This sequence prompts me and then waits for input to the MAKEDIR command. I must be careful not to enter anything other than y<return> for Yes or just <return> for No, or I will get an unwanted directory built. The FAILAT 25 command keeps me from getting an error from MAKEDIR when just a <return> is entered. This procedure substitutes for the lack of a query capability in CLI and can be modified to ask any kind of Yes/No question in a CLI command file.

Jay McDaniel
Las Vegas, NV

VIDEO CLOCK COUNTER

NO DOUBT YOU'VE noticed that the counters on video cassette recorders vary widely from machine to machine. ►

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Circle 33 on Reader Service card.

Counter numbers from tapes logged on one VCR won't match up when you play the tape back on another VCR. This can be maddening when you take the tape of your desktop video somewhere else for editing.

In the professional TV production world, something called SMPTE Time Code is used to give a numeric (digital) name and address to virtually every frame of video. Because it's highly standardized, the Time Code numbers will be the same on any machine in that format. They'll even remain the same when the video information is transferred between tape formats, if the proper equipment is used during dubbing. It's the electronic equivalent of optical edge numbering in film. Using Time Code is always expensive, hence out of reach for the average independent (or home) production.

If you have a genlock and two VCRs, try this the next time you make working copies of your stuff (something you should always do anyway, just like you do with your original disks).

Connect the outputs of the playback deck to the genlock inputs. Connect the output (audio and video) of the genlock to the inputs of the second (record) VCR. Connecting the output of the record VCR, either to a monitor or a TV for monitoring, is a very good idea.

Call up the clock on your Workbench disk. Change it to digital format. Next, bring up the preferences screen and set the clock to 11:59 pm. Put your original videotape in pause just about five seconds before the beginning of program material to be recorded. Put the record deck into record. Now you should have your Workbench screen, with the digital clock superimposed on top of your videotape signal.

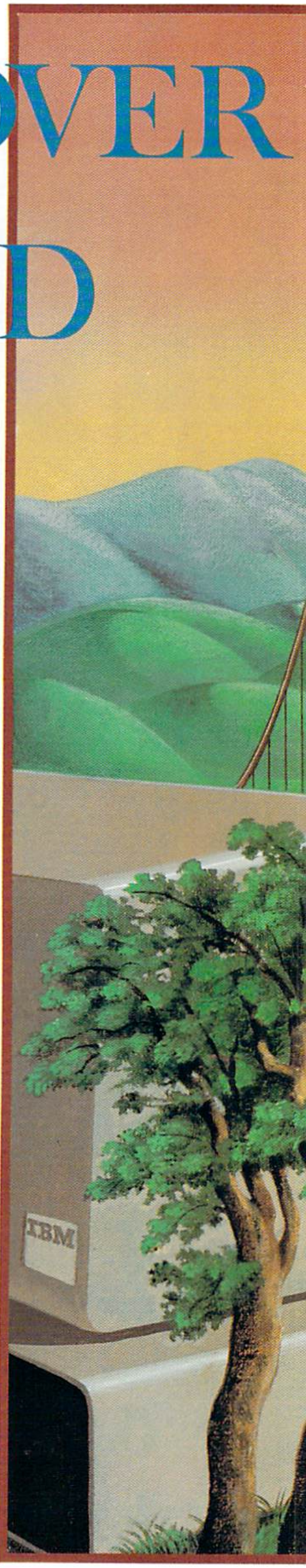
When the digital display of the clock approaches 11:59:55, take both decks out of pause at the same time. Within three to five seconds, everything will be up to speed and "locked," as they say, by 00:00:00. This will leave you with a pretty good time-to-picture reference on your newly-recorded copy to make an accurate log by. It won't be perfect, but you'll find that when you take the original tape or tapes into the edit session, the edit controller will be reading the control track pulses off the tape and converting them into hrs:min:frames. If you zero the edit controller readout at about the same place as where you started your "clocking" on your work copy through the genlock, searching and finding places on your original will be a breeze if you've made good notes during logging. Since you pay by the hour for editing, quick search times can save you a lot of money during the edit session.

Jim Passin
Chicago, IL

Editor's Note: This technique should be fine for any video work that you might need timing on (a track meet finish, surveillance/security cameras, real-time data acquisition, etc.).

If you have an idea you'd like to share with our readers, send it to AmigaWorld *Hors d'oeuvres, 80 Elm St., Peterborough, NH 03458. If your idea gets published, you'll receive an* AmigaWorld *T-shirt for your efforts. (Don't forget to tell us your T-shirt size.)* ■

BRIDGE OVER TROUBLED WATERS



WHEN THE AMIGA 2000 was introduced in February 1987, one of the very first expansion cards announced for the new machine was the Commodore A2088 Bridgeboard. An IBM PC/XT on a board, the A2088 was heralded as the long-awaited "bridge" to Amiga-IBM PC compatibility. Skeptics (myself included) were more than a little wary—once burned, twice shy, but *twice* burned, well. . . .

After all, at the official launch of the Amiga 1000 back in July 1985, hadn't Commodore pulled from its bag of magic tricks the now-infamous Transformer software that would achieve full IBM compatibility on a disk? When that bubble burst (it worked with only a few text-oriented programs, and even then at only 25–50% of the speed of the slowest—4.77 MHz—PC), even Commodore began downplaying the Transformer software, regarding it as a "stopgap" solution to be used only until the arrival of the real PC system—which would be a hardware add-on.

The SideCar was an Amiga expansion chassis that would ►

BY LOUIS R. WALLACE



WILL THE A2088 BRIDGEBOARD PROVIDE THE CONNECTION TO REAL AMIGA-PC COMPATIBILITY?

ILLUSTRATED BY ISADORE SELTZER

house an IBM in hardware, with a 5¼" disk drive, and offer Amiga expansion slots. However, while it actually did ship in Canada and Europe, very few found their way into the U.S. Those that did were so expensive ($995) that Commodore's promise to make the SideCar available at "substantially less than $1000" became a standing joke—albeit a very painful one to those Amiga users who had been waiting so long for a solution. The Holy Grail of promised PC-compatibility seemed to be receding back into the mists of some high-tech Avalon.

Third Time Lucky

Skepticism aside, this time Commodore has come up with a viable way to achieve Amiga-IBM PC compatibility. We have already profiled the A2088 Bridgeboard in a technical report when it was first announced and a prototype board was made available to the magazine (see Bob Ryan's "Between Two Worlds: The A2088 Board," p. 28, in the March/April issue of *AmigaWorld*.) The Ryan article presented the basic facts about the new board and explained how it would allow two separate computers to work in one box.

Now that the A2088 is out on the market and in use on a number of Amiga 2000s, we felt that an evaluation of the actual merits of the Bridgeboard would be in order. In other words, how good a PC is it? Is it a true clone? Does it have any special features? How fast is it? Does it degrade the Amiga's native performance? Is it a viable PC system?

A2088 Specs, Installation And Display

The A2088 ($699) is a 4.77 MHz PC/XT on a board. Containing 512K of RAM that is completely independent and isolated from any Amiga RAM, it also has 64K of dual port RAM for communicating information between the PC and the Amiga. It uses the Intel 8088 microprocessor, and while no 8087 math coprocessor is supplied, an empty socket for one is available. The BIOS (Basic Input/Output System) is made by Phoenix Technologies, the leading manufacturer of PC-compatible BIOS. (The BIOS was modified somewhat in order to work in the Amiga 2000 environment.) You also receive a 5¼" 360K disk drive for internal mounting in the Amiga; if you wish, a second external 5¼" drive may be added.

In addition to the hardware, there is a set of Amiga software tools that allows you to configure the type of screen you wish to use, as well as specialized utilities that allow a limited sharing of resources, such as disk drives, RAM and I/O ports. You also receive two PC disks, one which has DOS 3.2 and another with GWBASIC. Both disks come with extra utility programs and include manuals.

The 2000 system I used came with both the board and floppy already installed, but during the course of this evaluation I removed them both and reinstalled them. The process is not difficult, but even if you have never installed a PC board or disk drive before, the manual provides you with complete, step-by-step instructions and a dozen photographs to aid you in setting up the hardware. Depending in which slot you install the Bridgeboard, you will end up with either two PC slots and four Amiga slots free, or three of each type free. These can be used for other hardware additions.

> THIS TIME, COMMODORE HAS COME UP WITH A VIABLE WAY TO ACHIEVE PC COMPATIBILITY.

In order to use the hardware, there is a special library called Janus that must be installed on your system disk. Also needed are the PCWINDOWS, PCPREFS and PCDISK programs. To make it easy, a program is supplied to install these on your system disk.

The system uses the Amiga's graphics display system to create the IBM display, using either the monochrome text (MDA) or color graphics adapter (CGA) modes of operation. It does not support directly the now-standard EGA (Enhanced Graphics Adapter) display mode, but that can be added (see the "Hardware Expansion" section further on in this article). The IBM programs are displayed in Amiga windows, which have the normal assortment of menus and gadgets. You can use either the Workbench screen (four colors) or a custom screen (up to sixteen colors for text, four colors for graphics). The window borders can be turned on and off as desired.

You choose the number of colors to be used from the window's menus—an excellent time-saving option. The fewer colors, the faster the screen update. Even though the Amiga has blindingly fast graphics, it takes a little time for it to get the information from the PC side, convert it to bitmap (remember, there is no text mode on the Amiga, everything is graphics) and place it in the PC window. The more colors you have, the greater the number of bitplanes. The more bitplanes, the more time it takes to update the screen. The effect of this is that scrolling text in the PC window is sometimes jumpy. You can achieve best results when using four or fewer colors.

In my opinion, the four-color option is the best because the Workbench screen also uses four colors. If the PC window uses four colors, then the two can share the same screen—which means the PC can become part of the Amiga's desktop environment. I often work in interlace mode (640 × 400), and thus with this feature I can have a full-size Amiga screen and a full-size PC screen at the same time.

The default PC window is the monochrome text display. In order to change to color from the Workbench, you first type MODE CO80, then turn off the monochrome window, open the PC drawer from Workbench, select PC COLOR and open a new window, this time in CGA mode. Returning to monochrome mode involves a similar process.

I prefer to use the color window as my default, so I modified my startup sequence to run the PCWINDOWS program automatically with the color window

as default. This makes the PC always available, and it saves me time and effort when I power up. I also run the program called PCDISK from my startup sequence.

Sharing The Wealth

In order to share resources or transfer files, you must start PCDISK, a program on the Amiga side of the system. You can select it from the Workbench or from the CLI by using the RUN PCDISK command. Once activated, PCDISK allows you to transfer files easily between the two sides.

The GWBASIC disk also provides two very useful programs to aid in file transfer. AREAD.EXE enables you to copy an Amiga file on any Amiga drive to the PC side. AWRITE.EXE allows you to copy files from the PC to the Amiga. AWRITE even allows you to send files from the PC to Amiga devices, such as the printer or CON: window.

Another method of sharing information involves using the Amiga clipboard. Each PC window contains a menu option called edit, which allows you to use the mouse to copy and paste text within the PC display. When pasted, the text is typed to the display as if you were typing on the keyboard directly. This information is stored in the Amiga clipboard, where it can also be accessed by Amiga programs that use the clipboard, such as Notepad. Thus, using the mouse you can capture PC information and send it to the Notepad at the click of a mouse button. The reverse is also possible: You can send information from the Amiga through the clipboard and out the PC display.

Adding a hard drive to the PC side of the system is a third method of sharing resources. Although I did not check this personally (the hard drive on my PC is full), a utility on the DOS 3.2 disk should allow you to partition part of the MS-DOS hard drive in AmigaDOS format. This new drive becomes DJ0: (the J is for Janus); once formatted and mounted, it can be used by the Amiga just like any other Amiga drive. If you disregard the initial cost of the Bridgeboard, this becomes a very attractive and inexpensive method of adding a hard drive to the A2000. For example, 40MB drives for PCs are available for under $500; partitioning such a drive at 20MB for each DOS gives you a 20MB Amiga drive for under $250.

Another technique for sharing resources allows the PC to gain access to some of the Amiga's disk space, including the RAM disk. Because only one floppy comes with the Bridgeboard and almost all PC software requires two drives, you are almost forced to buy a second, external drive for the PC side. With PCDISK in operation, however, you can use the JLINK utility on the MS-DOS disk to create up to four virtual drives for the PC. These virtual drives can be on any Amiga disk: floppy, hard drive or RAM. Once you create them, you can access them from the PC side as drives C through F. I made one on the internal Amiga hard drive, copied all the MS-DOS commands over and designated a PATH to it. This became the SYSTEM disk for the PC. I then added an autoexec.bat file to my PC boot disk that automatically activated the virtual drive C and set the PATH to C. The Bridgeboard PC then became a two-drive system.

> THE BRIDGEBOARD OFFERS FLEXIBILITY FOR THE A2000 OWNER WHO NEEDS AN IBM COMPATIBLE.

Additionally, you can use the Amiga's parallel port as LPT1: on the PC side. When you are using it as LPT1:, however, you cannot access it from the Amiga side until you have disabled it from the PC side. You cannot use the Amiga's serial port at all from the PC side. In order to have a serial port for the Bridgeboard, you must add a PC expansion board that has one or more serial ports. The PC would then have exclusive use of these.

Finally, there is the as-yet-undemonstrated feature of the Bridgeboard that will allow properly designed software to use the 8088/8087 hardware as coprocessors for the Amiga. In this situation they would become part of the Amiga itself, just as the custom graphics and sound chips are. Specialized software is required for this, and so far none exists.

Compatibility And Performance

Of paramount importance in evaluating the Bridgeboard is the question of software compatibility. Exactly how PC-compatible is the Bridgeboard? While I have had neither the time nor the software resources to test every major PC program, I did use a fairly wide selection of PC software. In testing, I loaded and used Lotus 1-2-3 (spreadsheet), Condor3 (database), Microsoft Word (word processing), MathCAD (numeric analysis), QuickBasic 3.0 (BASIC compiler), TurboBasic 1.0 (BASIC compiler), Microsoft's Flight Simulator, Zork I (text adventure game), StarFlight (graphics adventure game), P (a set of graphics demos), Stargate Defender (arcade game) and several Norton Utilities. All worked as expected on a standard 4.77 MHz PC, except that screen updates were slow. This does not significantly affect the performance of most of the programs, but it does make Stargate Defender essentially unplayable. I do not expect to play any fast action games in PC mode using the Amiga PC windows.

In addition, using QuickBasic 3.0, I wrote and compiled several programs used to test the performance of various aspects of the Bridgeboard. These worked on the Bridgeboard as well as on a PC clone I used for comparison. Because the Bridgeboard uses both a standard Intel 8088 as well as Phoenix BIOS, it does achieve, as expected, a high degree of compatibility with PC software.

One of the standard methods of comparing PCs and compatibles is the Peter Norton System Index. Using some arcane reckoning known only to himself and a few disciples, Norton compares the prospective clone against a standard PC, XT or AT. When I used this index to test the Bridgeboard, it gave a value of 1.0, ►

meaning it was exactly comparable to a standard XT.

Not that I don't trust Peter Norton, but I wanted to run a few tests myself. I used three programs as benchmarks. One tested the speed of disk access, writing 10,000 words to a file and then reading them back. The second performed 10,000 integer multiplications, while the last—the Savage floating-point benchmark—tested the speed of the floating-point operations. The individual results are given in the chart below. None of these operations accessed the screen, so that was not being tested.

The PC used as a comparison was a switchable turbo model, running at either 4.77 or 8 MHz and equipped with a V20 chip, making it about 10% faster than it would have been using the standard Intel chip. It also was equipped with an Intel 8087 math chip, so the Savage results would have been in the turbo clone's favor no matter what. Nevertheless, the three programs indicate you will get a performance somewhat less than a standard PC at 4.77 MHz. With allowances for the V20 and math chip, I estimate about an 85-90% performance rating when compared to a plain vanilla 4.77 MHz machine.

Test	PC 4.77	PC 8	Bridge A:	C:	D:
R/W	118.0	89.0	147.0	105	95
INT Mult	5.4	3.1	6.4		
Savage FLOAT	128.4	74.4	174.8		

Note: All times in seconds. Drive C: was a virtual drive on DH0:, while drive D: was a virtual drive on RAM:.

Hardware Expansion

Depending in which slot you install the Bridgeboard, you will have either two or three additional PC slots available to accommodate a variety of PC add-on cards—hard drives, hard cards, graphic cards such as EGA, internal modems, multifunction cards that give additional RAM and/or I/O ports, local area networks and so forth.

I tried two different experiments to get a flavor for Bridgeboard expansion. In one I installed a Paradise EGA card in the A2000 and hooked up a Samsung dual frequency EGA monitor. While the Bridgeboard was still sending information to the PC window on the Amiga display, it was also sending it to the EGA system—with no delays. It looked very good and seemed to work without problems. The Norton System Index program recognized the EGA card was in place, and programs designed to work in EGA mode functioned properly. I resized the PC window on the Amiga to postage-stamp size and moved it out of the way. When I wanted to access the Amiga, I would click in the Amiga windows, and when I wanted to use the PC mode I would click in the postage-stamp window and activate the PC.

The second experiment was more complex and ambitious. Because there are add-on boards that turn XTs into ATs (as well as ATs into 80386 machines), I thought it would be interesting to see if the XT in the Bridgeboard could be transformed into an AT. Commodore has indicated an AT-style 80286 Bridgeboard would be released at a future date, but perhaps it would be possible to achieve the AT transformation with the existing Bridgeboard.

THE ONLY NEGATIVE ASPECTS ARE THE SLOW SCREEN UPDATES AND THE PRICE.

For the test I used a 12 MHz 80286 accelerator from Micro Way equipped with an 80287 math chip. I removed the 8088 from the Bridgeboard, inserted a cable into the 8088's socket, put the Bridgeboards' 8088 onto the Micro Way board and put that board in one of the PC slots. Theoretically, I should then have had a 12 MHz AT. The only problem was I got a "bad boot disk" error on the PC side when I powered up. I checked all the connections and tried again—with the same results. I took everything back apart, restored it to its original state and turned on the Bridgeboard; it worked just as before, so the problem did not lie there. Because I had borrowed the 80286 board, I did not spend any more time trying to make it work. Also, I had heard that other PC clone users had gotten the same "bad boot" error with this board. Thus, I still feel that the AT transformation can be done, perhaps with a different 80286 board.

Another Bridgeboard upgrade route may lie with using a 68020/68881 board, such as the 14 MHz Turbo Amiga board from CSA. (See Bob Ryan's article "Turbocharging Your Amiga 2000" in this issue, p. 26.)

Can You Get to the Other Side?

There can be no doubt that, for the A2000 at least, IBM compatibility has arrived. The Bridgeboard is a very compatible clone and uses most PC software and hardware properly. It offers quite a bit of flexibility for the A2000 owner who needs an IBM compatible, yet does not want to sacrifice the power and versatility of the Amiga.

The only negative aspects are the slow screen updates and the price of the Bridgeboard itself. For $700 on today's market, you can get a two-drive, 640K turbo XT complete with monitor and monochrome graphics. Yet, considering that hard drives for the Amiga are still in the $1,000 range, the Bridgeboard offers you a hard drive and PC clone for the Amiga at about the same price. And, as it seems that hardware prices are like leaves in autumn, we can reasonably expect to see them fall in due course. Overall, however, the Commodore A2088 Bridgeboard is the first serious answer to Amiga-IBM PC compatibility we have seen. ■

Louis R. Wallace is a Contributing Editor to AmigaWorld *and Technical Manager of* RUN. *Write to him c/o* AmigaWorld, *Editorial Dept., 80 Elm St., Peterborough, NH 03458.*

TURBOCHARGING YOUR AMIGA 2000

In combination with a 32-bit memory board, the CSA 68020 CPU Board will let your Amiga burn rubber. Just be prepared for "sticker shock."

By Bob Ryan

There's no denying the Amiga 2000 is a mean machine. With a 16/32-bit Motorola 68000 engine, overhead cam custom chips, 25 fuel-injected DMA lines and a megabyte of high-octane RAM, it blows the doors off of any other microcomputer in its class. But for some applications, especially big-time number crunching, even the A2000 can use a boost. Right now, there's no better boost available than the 68020 CPU Board from Computer System Associates. With its 14.32 MHz MC68020 microprocessor and MC68881 math coprocessor, CSA's board lets you power your Amiga to higher performance.

The 68020 is the big brother of the 68000. It is a true 32-bit processor, with 32-bit registers, a 32-bit address bus and a true 32-bit data bus. In comparison, the 68000 has 32-bit registers but only a 24-bit address bus and a 16-bit data bus. The 68020 is designed to execute the same instructions as the 68000 (one notable exception is listed below); thus, software written for the 68000 should work with the 68020. Because the 68020 can use much higher clock rates and fetch 32 bits of information at a time, it should theoretically outperform the 68000 by a factor of at least 4.

The 68881 is dedicated to performing mathematical functions very quickly. Both the 68000 and the 68020 can perform only basic math functions, while most floating-point math is done by software. The 68881 performs floating-point math in hardware—at speeds much faster than software.

The CSA 68020 CPU Board is designed to let the Amiga 2000 take advantage of the power of these two chips. The results you get from the board depend in large part on the applications you run.

DROP IT IN . . . LET IT RUN

The 68020 CPU Board fits into the Amiga 2000's CPU slot—the 86-pin slot Commodore provided for coprocessor boards. Boards in the CPU slot have the same level of access to the system bus as does the 68000; thus, they can take over the operation of the Amiga. To install the board, unplug the machine and remove the five screws that keep the case attached and slide it off. The CPU slot is the first slot on the left (discounting the video slot in the left rear). After touching a grounded component such as the power supply, you simply nudge the board into the slot.

If your Amiga 2000 has a revision 4.2 motherboard, it changes the CPU slot slightly and you will have to cut a trace and install a jumper on the motherboard to get the CSA board to work. Revision 3.9 works without any problems. (The revision number is located at the front-right corner of the motherboard.)

Once you have placed the board into the CPU slot, physical installation is complete. No special software installation is required. You boot the system normally with Workbench.

The CSA board will shut out the 68000 and take over the system. The board has a timing clock that runs at 14.32MHz—twice as fast as the 7.16MHz clock that drives the 68000. Thus, operations run twice as fast inside the 68020 as they do inside the 68000. When addressing Amiga memory or the custom chips, however, the 68020 gets throttled back to 7.16MHz ►

ILLUSTRATED BY RON LIEBERMAN


Amiga

because the rest of the Amiga system is designed to work at this rate. The 68020 is, in effect, emulating the Amiga's 68000. The 68881 always runs at 14.32MHz, however, because it commmunicates solely with the 68020.

To test the efficiency of this setup, I ran the Dhrystone benchmark from the first Fred Fish disk. I was surprised to find that, according to the benchmark, the 68020 board performed at only 86% of the speed of the 68000! A call to CSA revealed the problem: The 68020 naturally generates 32-bit addresses and expects data in 32-bit chunks. It takes additional time for the processor to generate a 24-bit 68000 address to access the 16-bit memory of the Amiga. Thus, for many operations, the 68020 will actually degrade the performance of the Amiga slightly.

If that is the case, then why in the world would you want to put the CSA board into your computer? The answer lies with the 68881 chip. For software that supports it, this chip makes a world of difference. For example, I received recently the latest version of Sculpt 3D, the ray-tracing graphics program from Byte by Byte, which supports the 68881 chip. Sculpt 3D uses thousands of floating-point operations to produce the most startling graphics available on the Amiga. The problem is that it can take hours—and sometimes days—to render one image.

To test the performance benefit of the 68881 chip, I did two renderings of the coffee cup picture available as an example on the Sculpt 3D disk. I changed the standard settings to maximize the amount of floating-point operations while minimizing the amount of time I would have to stare at a stopwatch. (For Sculpt 3D users, I set Mode to Photo, Interlace; Anti-aliasing to Best; and size to Tiny.) Without the 68020 CPU Board, it took Sculpt 3D 999 seconds to render the image; with the board installed, it took 256 seconds—a four-fold increase in speed. Clearly, the 68020 CPU Board makes Sculpt 3D a lot more efficient.

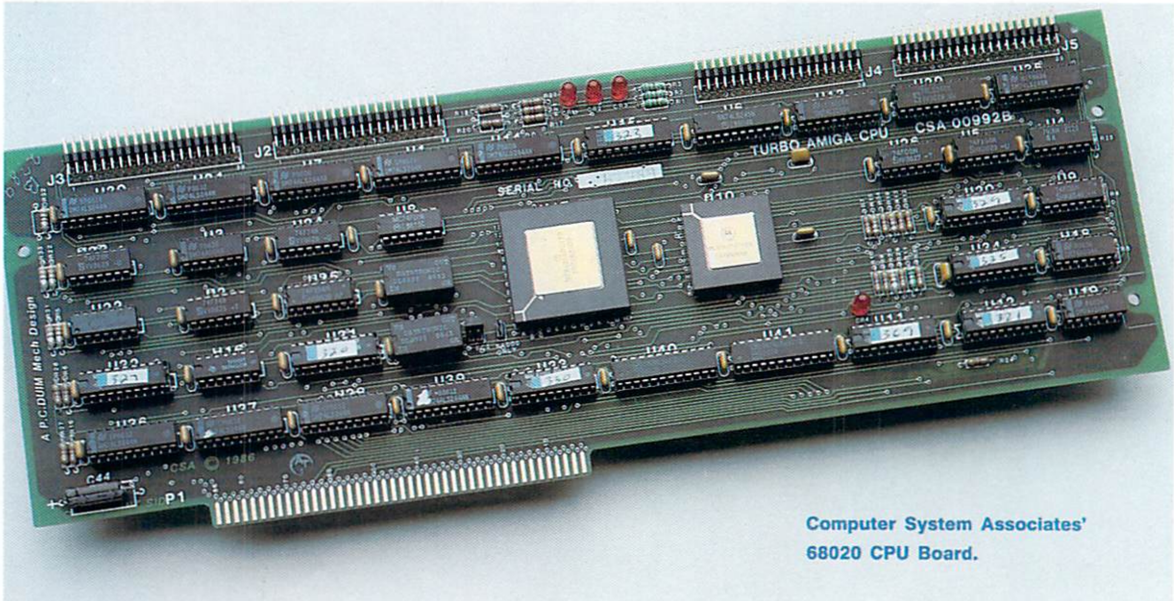
But . . . More Horsepower Required

Of course, you may not be willing to sacrifice 15% of your computing power just to run those few programs that support the 68881. Ideally, you would like to take full advantage of the 68020 running at 14.32MHz, but the bottleneck at the interface between the Amiga bus and the CSA board prevents that. To eliminate it and to get the 68020 running at full speed, CSA produces a special 32-bit memory board for use in conjunction with the 68020.

I installed the board into an expansion slot in the A2000. It's not a normal Zorro board; instead of transmitting data via the Zorro bus, it attaches directly to the 68020 CPU board via four ribbon cables. Ribbon cables create a 32-bit bus that lets the 68020 access the memory on the board at 14.32 MHz—bypassing the bottleneck described above.

Because the 32-bit memory on the board lies outside the address range of the 68000, it can be accessed only by the 68020. To get AmigaDOS to recognize the existence of the memory (and consequently to load programs and data into it), you have to run a program (addmem) from your startup-sequence file. Although addmem can cause conflicts with auto-config devices, here there are no problems because the memory does not reside in the 8MB auto-config address range.

Once I installed the board and ran addmen, I ran the Dhrystone benchmark again. This time, the combination of the 68020 CPU Board and the 32-bit memory board outperformed a bare-bones Amiga 2000 by a factor of 2.8. I then used Sculpt 3D to render the coffee cup in 127 seconds, nearly eight times faster than with a standard Amiga. Clearly, the way to really improve the overall performance of ►



Computer System Associates' 68020 CPU Board.

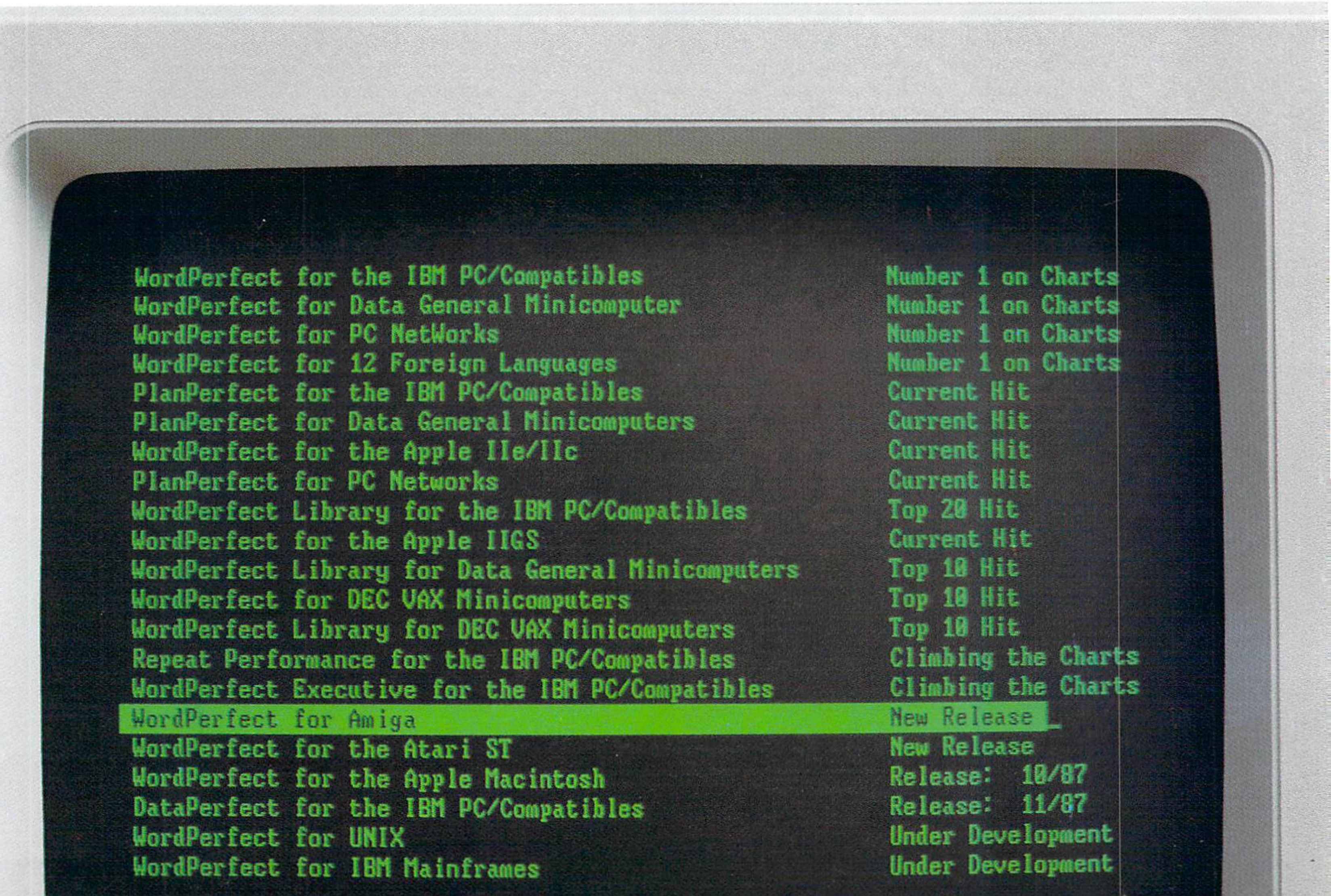
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your Amiga 2000 is to use the 68020/68881 board in conjunction with 32-bit memory.

What About Engine Knock?

Granted you now have a lot of power under the hood—but let's see if you're just spinning your wheels a lot faster. To test software compatibility, I ran several dozen popular programs with the 68020/68881 board and found that they all worked. On the graphics side, Sculpt 3D, VideoScape 3D, DeluxePaint II, DigiPaint and Aegis Images all worked well. I also used WordPerfect, ProWrite, MaxiPlan Plus, PageSetter, CityDesk and a few other productivity packages; again all worked without difficulty. In general, if developers follow Commodore's guidelines (always generate 32-bit addresses and avoid the MOVE SR,<ea> instruction), software that runs on the 68000 will run on the 68020. Incompatible software, however, undoubtedly exists, and it is advisable to ask specifically about your application before you buy one of these boards.

The most important piece of software I found that would not run with the 68020 is Amiga Basic. Apparently, the folks at Microsoft wrote Amiga Basic to generate 24-bit addresses—which are insufficient for the 68020.

Many high-level languages now offer support for the 68020 and the 68881. Manx C and Absoft Fortran support both chips. According to sources at Commodore, the next release of AmigaDOS will contain a 68881library that will increase greatly the number of software titles that take advantage of the 68881. The library will emulate the 68881 in software, freeing programmmers from having to write two versions (one supporting the 68881, the other not) of the same software. If a program uses the 68881 library, the math routines will execute in hardware if the 68881 is present, and in software if it is not.

In terms of hardware compatibility, as of this writing there are not very many boards available for the Amiga 2000, making testing comparatively easy. The 68020/68881 board in conjunction with the 32-bit memory board worked well with the Commodore A2052 2MB RAM Board and with the A2088 Bridgeboard. The 68020/68881 board, however, did not enhance the performance of the Bridgeboard in any significant way. (See "Bridge Over Troubled Waters," p. 20 in this issue of *AmigaWorld*, for an evaluation of the A2088 board.)

My biggest disappointment came when I discovered that the 68020 CPU Board did not work with the Commodore A2090 Hard Disk Controller. Although CSA makes a SCSI interface and drive for the system, I have no intention of throwing out my current hard-disk system. At press time, neither Commodore nor CSA could explain why the two boards were incompatible.

Road Test Results

The basic design of the Amiga is quite intricate and sophisticated, and the operation of the custom chips is highly dependent upon precise timing. Thus, you cannot speed up an Amiga the same way you can an IBM PC or an Apple II by simply adding a card with a faster processor—the current crop of custom chips can only operate at 7.16MHz. Don't expect the CSA 68020 CPU Board to speed up your Amiga under normal circumstances—it won't. If your software does not support the 68881 chip, the board alone will actually degrade the performance of your system. To achieve an increase in performance of 2.5 to 3 times that of a standard Amiga 2000, you must also buy at least 512K of 32-bit memory. (You can increase performance further by buying even more 32-bit memory.) Thus, turbocharging your Amiga will set you back at least $2,800.

Of course, if you need 68881 support—for instance, if you are using Sculpt 3D to produce professional-quality video images—then the $1,500 68020/68881 board may be worth the savings in time. On full-screen Sculpt 3D renderings, the 68881 can increase performance by a factor of 10 without using a 32-bit memory board. Also, universities and research institutions that have the resources to write custom applications employing the 68881 can get a lot of mileage out of the CSA board. For average users, however, the CSA 68020/68881 board will not be of practical value until support for the 68881 is more widespread.

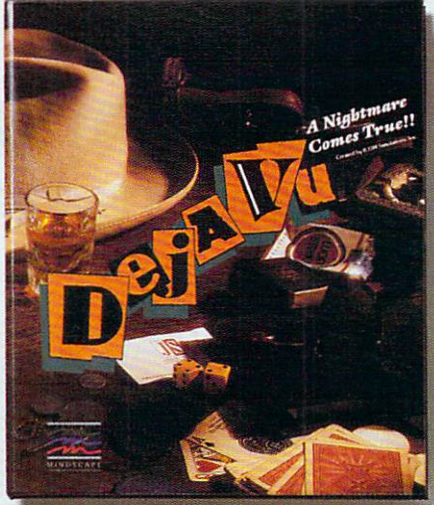
The CSA 68020 CPU Board is an expensive product that will, with specific applications, greatly increase the speed of your Amiga 2000. With some 32-bit memory, it will increase the speed of any Amiga application. The board is well built and well supported. It is not for the casual user, but it is a good solution for those who use the Amiga in serious graphics and number-crunching applications. ■

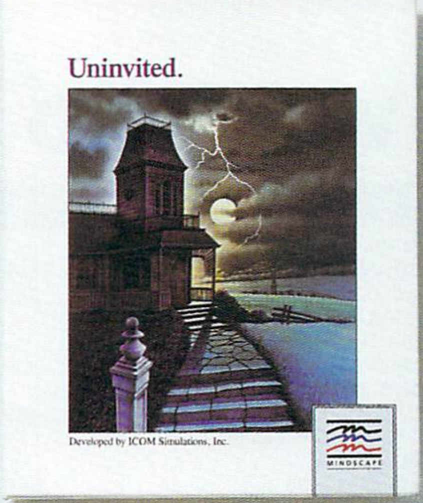
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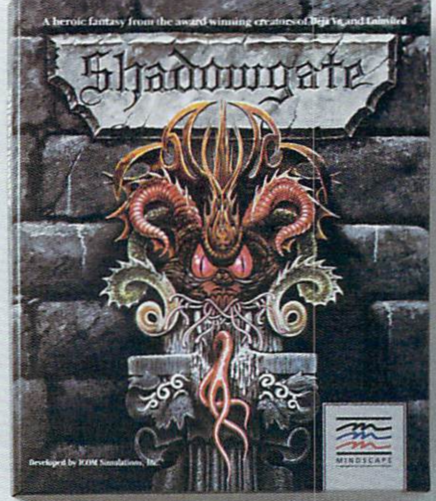
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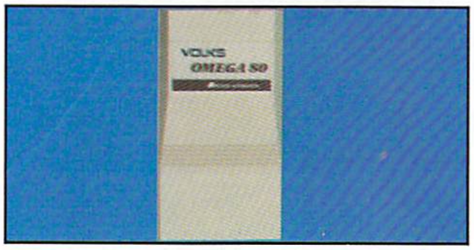
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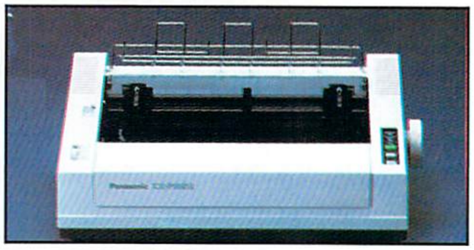
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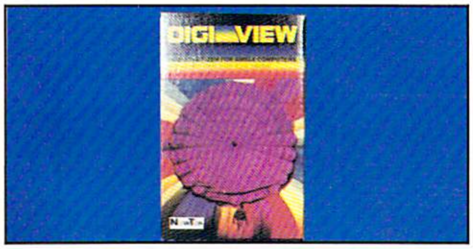
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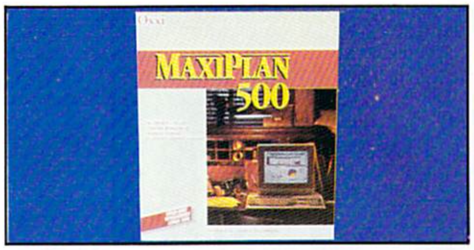


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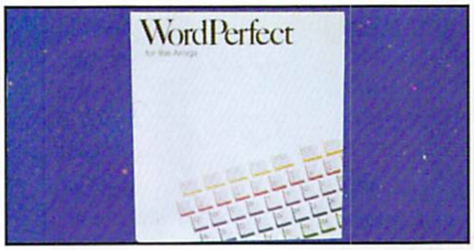


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YOU CAN'T GET THERE FROM HERE

It's a rocky road on the upgrade path from C-64 to Amiga.

By Guy Wright

UPGRADING FROM ONE COMPUTER system to another is a bit like traveling in Maine or New Hampshire: Somewhere along the way you'll be told "you can't get 'theyah' from 'heah'". There is always something that won't work. Usually the software is incompatible or the peripherals can't be plugged into the new ports. There is no such thing as an all-encompassing standard in the computer industry. It is also inevitable that if you buy a particular computer today, it will be superseded tomorrow by something better. By that time you have spent a lot of money on software and peripherals that are not going to work on the newer model.



Let's say that you bought a C-64 or C-128 a while ago and you have been thinking about upgrading to a new Amiga. You have a choice: You can either stick with the old C-64 and grimace every time they come out with something super for the Amiga, or you can throw away your old system, software and peripherals and start over again from scratch. Neither idea is particularly appealing.

But wait, you have heard that there are software emulators and other devices that will let you use some of the old C-64 peripherals on the Amiga! A perfect solution. Just sell the old C-64 (or give it to your niece for Christmas), buy a new Amiga, a C-64 software emulator and one of those cables that lets you use your old disk drive, monitor and printer. What could be easier? Camels through the eyes of needles?

Another scenario of the same flavor: You don't know where the people at the user group get their money for memory, hard disks, external drives and every software package that comes along, but *you* have to work for your money. It seems like you are the only person on the planet who has a straight-from-the-box basic Amiga setup and only a few programs. If only the Amiga software was as cheap as some of that C-64 software. A software emulator, however, would cost only about as much as one Amiga pro- ►

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THE ONLY DEVICE THAT WILL GIVE YOU 100% C-64 COMPATIBIL-ITY IS A C-64. PERIOD.

gram, and if you could save $30 to $100 on a handful of programs, then it would pay for itself in no time!

Yet another scenario: You bought a C-64 a few years ago and built a pretty respectable software library. The C-64 was what got you interested in computers in the first place and has been a trusted friend. When the Amiga came out you thought about it for a while, decided it was never going to be an easy decision, gritted your teeth and bought one. Yet, you could not quite give up the old 64. Now you have both machines set up next to each other, fighting for precious desk space. You like using the Amiga but you have a lot of files in C-64 format, a lot of BASIC programs you wrote for the 64, a lot of 64 public domain programs, a lot of games for the 64, a lot of word processing documents done on the 64, a lot of. . . well, you get the idea. If you bought an emulator, maybe you could transfer a lot of those programs and documents over to the Amiga . . . maybe use your favorite 64 word processor . . . maybe even play some of those 64 games on the Amiga . . . maybe . . . .

It seems like emulators might be the answer for each of these problems, but before you rush out and buy anything, there are a few things that you ought to know.

First, the *only* emulator or device that will give you 100% C-64 or C-128 compatibility is a C-64 or C-128. Period. Second, the initial cost of the emulator might not be the total cost. Third, even if you can get a particular C-64 program to load and run on your Amiga, do not expect it to perform the same as it does on the C-64. The odds are that it will be painfully *slow*. Fourth, not all of these products work on all of the Amigas.

With those things in mind, let's take a look at four products available now that, to one degree or another, let you upgrade from the C-64/C-128 systems to Amiga systems.

C-View: Can Do

First, and probably the most reasonable upgrade device, is C-View from C Ltd. C-View is an adapter cable that changes the RGB output from an Amiga into chroma/luma output compatible with the Commodore 1702 monitor. It gives you a good quality image and a usable 80-column display on a 1702. C-View retails at $49.95 and if you already own a 1702 (or 1701 or compatible monitor that requires chroma and luma input), you will not have to spend $400 for the Amiga 1080 monitor. The picture you will get on a 1702 is not quite as good as on a 1080, but it is close enough so that you may decide you will never need one.

Short, sweet and to the point. The C-View works well at a good price.

Access-64: No Less, No More

The next upgrade path you might consider is the Access-64 device from Dynamic Software Technologies (and marketed by Progressive Peripherals). Access-64 lets you use 64 and 128 peripherals (specifically, the 1541, 1571 or 1581 disk drives and Commodore 64/128 serial printers) as if they were Amiga peripherals.

Access-64 attaches to the parallel port and will drive up to four devices (three disk drives and a printer). It uses the Mount command to link with the Amiga operating system and is fully Workbench-compatible (creates icons). Access-64 also loads a "Turbo-disk" program into the 1541/1571/1581 disk drives to speed up their operations.

Access-64 performs a number of functions that could be of value to a 64/128 owner wishing to upgrade to an Amiga 500. First, there are utilities for transferring files from a 64- or 128-formatted disk to the Amiga and vice versa. Practically speaking, this means you can get PET ASCII, ASCII or sequential files off a 64/128 disk and into your A500. Another utility program translates PET ASCII (not true ASCII) into pure ASCII so that the files can be read by most of the word processors and text editors available for the Amiga 500. Thus, if you have a lot of documents written with EasyScript or PaperClip, or any other C-64/C-128 word processor that can save documents in ASCII format (which most of them can), you will be able to transfer those documents over to the Amiga where you can read them with Textcraft or WordPerfect, LPD or ED, or any other Amiga word processor that reads ASCII (most of them can). You should also be able to transfer Amiga-generated ASCII files onto a 64/128-formatted disk so that they can be read by a 64/128-based word processor or text editor. Access-64, however, cannot translate from true ASCII into PET ASCII—only the other way around.

Another function of Access-64 is to let you use 1541/1571/1581 disk drives as if they were external Amiga drives. The Workbench disk that comes with Access-64 mounts the drive or drives so AmigaDOS sees them as DF8:, DF9: and DF10: (if you have three drives connected in a daisy-chain fashion). But they are not true Amiga drives! A 1541/1571/1581 will only hold 170K per disk. The 1581, even though it is a 3.5″ drive, *cannot* read Amiga disks.

If you want to use the 1541/1571/1581 drives as Amiga external drives, you must first "hard format" them, using a utility supplied with Access-64. This takes about a minute and thirty-five seconds. Then

you must initialize the disk from Workbench, which takes about twelve minutes and fifteen seconds or longer. (By way of comparison, it takes an Amiga drive just under two minutes to initialize a disk with eighty cylinders. The 1541/1571 use only thirty cylinders, the 1581 can use up to 79 cylinders but takes a *long* time to format. That makes the Amiga drives about three times faster than the 64/128 drives.) This speed reduction is going to surface any time you access the 1541/1571/1581 drives.

Another feature of the Access-64 device allows you to use a CBM serial printer on the Amiga—although, currently, there is no graphics dump capability. You can only send straight ASCII files to a C-64/C-128 printer. These printers have never been renowned for their performance or graphics abilities, but if you already have one, at least you could print things while saving up for a better printer.

Dynamic Software Technologies does not claim that Access-64 is an emulator. It is a device that lets you get information back and forth between an Amiga 500 and a C-64/C-128 disk drive or printer. Utilities that come with the device perform their tasks well (even if the tasks are somewhat limited). If you know what to expect, then Access-64 does an excellent job. It is very simple to hook up, and the integration of C-64/C-128 devices into Workbench is very smooth. If you just want to use a 1541/1571/1581 as another external Amiga drive for storage, you can get all the instruction you need from a page or two of documentation. Even transferring text files is a fairly simple operation that takes very little effort.

Do not expect to transfer programs into the Amiga and run them. You may be able to transfer programs and look at the code. (BASIC programs on the C-64/C-128 are saved in tokenized format and thus will not look like BASIC listings, but you should be able to transfer and look at Assembly source code without any trouble, depending on your assembler.)

Also, do not expect the 1541/1571/1581 to perform like Amiga drives. They cannot read Amiga-formatted disks and they cannot be used to read MS-DOS disks with the "Transformer" software. (A 1541/1571/1581 cannot be used like the A1020 disk drive.) They cannot store nearly as much as an Amiga disk, and they are agonizingly slow. The latter is not the fault of Access-64; the drives were built slow in the first place. It has been said that the only advantage of a 1541 disk drive is that it is faster than typing.

If you have a lot of text files that you would like to transfer back and forth between an Amiga and a 64, Access-64 is probably worthwhile. If you have only a few files and a modem for each machine, you might consider using a telecommunications package to transfer them (either through a nul-modem or from a friend's house, or by uploading the files from one computer to your own E-mail box and then downloading them into the other computer). If you have a 1541/1571/1581 lying around, and you do not mind their slowness, and you just want some extra disk storage space, then Access-64 will work nicely. (Maybe you got a deal on 5 1/4″ disks and have a few hundred in your drawers?)

If you have a 1525 or MPS 801 compatible printer that you want to use for printing listings or letters or anything that does not involve graphics, Access-64 should also work. You may have to play around before getting tabs and proportional spacing to print out. . . well, perhaps you should probably be thinking about a new printer, anyway.

To wrap it up: Access-64 is a nice little device that performs as advertised. It is *not* a software emulator. It allows you only to use the 64 disk drives and printers as Amiga peripherals. Printer use is bare bones ASCII (no graphics). Text files can be transferred from 64-formatted disks to the Amiga, then translated from PET ASCII into true ASCII. The drives cannot read Amiga disks or MS-DOS disks when using the Transformer software. They can be used as storage devices, but they have much smaller capacities and are much slower. Access-64 is easy to use and well integrated into the Workbench environment.

Depending on what you want to do, Access-64 might be just what you need as a step on the upgrade path.

Go-64!: No Crowds Roar

Go-64! from Software Insight Systems is a C-64 software emulator for the A500, A1000 and A2000. (You need a parallel port conversion cable, *not* a simple gender changer plug, for the A1000, and these retail for about $29.95 from a dealer.) The device plugs into the parallel port and lets you use 1541/1571 disk drives or C-64 compatible printers. Go-64! also lets you use C-64 joysticks, paddles and light pens.

Go-64! has its own Workbench disk containing the main program, a C-64 system Preferences for special software and a Notepad file for updates. When you click on the main program icon, you are given a title screen and then the Amiga pops into 64 mode. From there the Amiga behaves like a C-64 (or C-128 in the 64 mode). All disk access is the same as it would be if you were using a 64. BASIC uses the same commands and syntax as on a 64. Pokes and Peeks are pretty much the same as on a 64—with some differences (more on that later). The keyboard is also mapped similarly (which causes some confusion because the keys on an Amiga are not labeled like they ►

ACCESS-64 PERFORMS AS ADVERTISED, BUT IT IS *NOT* A SOFTWARE EMULATOR.

are on a 64). Beyond that, however, you start running into trouble.

Right at the beginning it should be stated that the people at Software Insight Systems do not claim 100% compatibility or even close to 100% speed. They are working on it but have a long, long way to go. They said that they sacrificed speed for compatibility whenever there was a conflict—and it shows.

Go-64! is slow. Very slow. A simple FOR/NEXT loop counting to 10,000 takes about 40 seconds, compared with 13 seconds for a real C-64. Writing to the screen takes a long time. In fact, anything that has to do with graphics or printing to the screen takes a long time. Graphics are what slows down Go-64! the most. Programs that are more computational than graphic will run faster, but do not expect either to be as fast as a C-64. You can expect a 64 program on the Amiga to run anywhere from 30% to 90% as fast as it would run normally (if it runs at all). The company claims that the average speed is from 60% to 70% as fast.

Go-64! does not support peripherals that use the cartridge, cassette or USER ports (which eliminates most 64 modems and printer interfaces that get their power from the cassette port on the 64). It does support game paddles and light pens, but you must select these devices from the Preferences section. Go-64! does not support sound. The system will not crash when programs try to use sound—but you won't hear anything either.

Go-64! takes complete control of the Amiga, eliminating multitasking. This means that you cannot use any C-64 peripherals from the Amiga mode (printers, for example). You can run Go-64! from Workbench.

Go-64! is a byte-for-byte mapping of the 64, *but* the C-64 ROM routines have been rewritten completely, so there may be problems with programs that make calls to these routines unless they use the standard entry points. You will also have problems with programs that copy the 64 ROM routines to RAM and modify them. Go-64! offers a "solution" to this problem. Simply copy the real C-64 ROMs onto the Go-64! Workbench disk, and the program will use those instead. This is fine but it is a complicated procedure (as the manual states, "if you are a technically experienced C-64 owner"). You need telecommunications software with modems or direct connect cables and a file transfer program (for example, Disk-2-Disk) "which may require an Amiga 1020 disk drive," and you need a C-64. This is not the fault of Software Insight Systems. The C-64 ROMs are under copyright and the company cannot sell them. It is legal to copy the ROM routines yourself only if you own the C-64; it gets sticky otherwise (using a friend's 64, for example). The company does provide a BASIC program to perform the ROM download from a C-64; the rest is up to you.

Go-64! loads many programs, even copy-protected ones, in its normal mode. There are also special routines for loading programs that use Turbo load routines (special routines designed to speed up the loading of programs from a 1541). These routines (the company calls them Hyper-codes) are accessed through the 64 Preferences section of the program. Hyper-codes may be the biggest advantage in Go-64! The company plans to offer disks of Hyper-codes for particular programs in the future. Hyper-code files will be available on Quantum Link, through a company BBS or directly through the mail. With Hyper-codes you can load and run different programs without changing the main Go-64! program. Select the appropriate Hyper-code (Geos, for example) from ►

A Comparison of Two C-64 Emulator Programs

	Go-64!	The 64 Emulator
Price	$69.95	$39.95 (plus $20 for serial adapter)
Plugs into parallel port	yes	yes
Supports 1541/1571	yes	yes
Supports C-64 sound	no	yes
C-64 ROM routines included	no	yes
Supports multiple sprites	yes	with difficulty
Supports raster interrupts	yes	with difficulty
Supports turbo loaders	some (with Hyper-codes)	no
FOR/NEXT TO 10,000	40 sec.(aprox)	57 sec.(aprox)
Starts from Workbench	yes	no
File transfer utility	no	yes
Uses C-64 drives as Amiga drives	no	yes
Support CBM serial printers	yes	yes
Monochrome mode	no	yes
Alternate character set	no	yes
Re-map Amiga keyboard	yes	yes (partially)
Supports C-64 Basic	yes	yes
Supports C-64 disk commands	yes	yes
Upgrade policy	yes	yes
User support	yes	yes
Supports paddles, joysticks, light pens	yes	yes

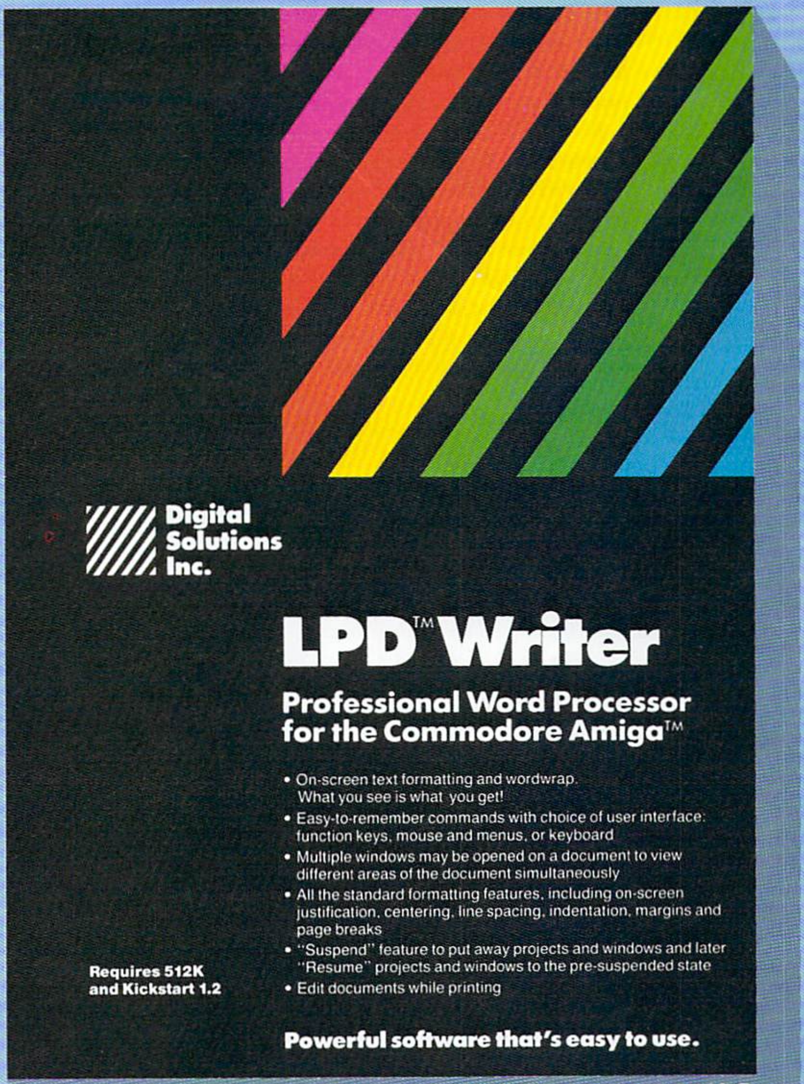
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the 64 Preferences section, and you are ready to go.

Or not.

There are many, many programs that will not load and do not yet have Hyper-codes written for them. Even if you can get a program to load and run, it may be so slow as to make it useless. Most arcade games that load and run are worthless even at their hardest settings. (Most arcade games are graphics-intensive, which slows down Go-64! quite a bit.) Unless you want to see what it is like to score sixty billion on an arcade game, there isn't much point. Text adventures, illustrated text adventures, some arcade games and games that use more number-crunching than graphics (such as the chess game Sargon III) are more suited to Go-64!, *but* only if you can get them loaded in the first place. And the only way to find out if they load in the first place is to try them.

Programs like word processors, databases, spreadsheets and anything that does not rely on graphics or speed should work fine—again, *if* you can get them to load in the first place.

There are other minor problems with Go-64!, but they are insignificant compared with the two major problems. First, there are thousands of programs for the 64 out there and many of them use custom turbo loads—meaning that Go-64! may or may not load them and may or may not have Hyper-codes for loading them now or ever. Second, the programs that do load and run are slowed down so drastically that most of them are rendered useless.

There is no way to tell ahead of time which C-64 programs are going to load, which will run properly if loaded and which will still be usable even if they do load and run properly. Go-64! may be useful for some people, but if, however, you are looking for a serious, practical way to upgrade to an Amiga, do not expect too much.

The 64 Emulator: Shut The Door, See You Later

The second program under review that is properly a software emulator is The 64 Emulator from ReadySoft. It is sold in three different configurations: without the serial interface, with an A1000 serial interface or with an A500/A2000 serial interface. Each serial interface plugs into the parallel port, and your C-64/C-128 devices plug into that. The 64 Emulator supports some Amiga hard-disk drives but does not claim to support all of them.

The 64 Emulator comes on its own Workbench disk and contains a configuration editor utility that lets you tell The 64 Emulator what hardware you have connected and assigns disk drives to various numbers and modes. You can, for example, use an Amiga drive to emulate a 1541 in the way it stores and retrieves data (if you want to use a 64 program to save and load files on an Amiga disk), but the Amiga drives will hold only as much as a normal 1541 (170K). The configuration editor also allows you to assign printer modes (enabling you to use an Amiga or 64 compatible printer for 64 software output). No conversion is done on the output to the printer—that must be handled through the software. The program supports Amiga modems but not C-64 baud rates of 50 and 75.

You must select what kind of input device you will use (joystick, Amiga mouse or light pen). The program enables you to emulate a 1350, 1351 or game paddles with the standard Amiga mouse. If you move the mouse without setting it to paddles in the configuration editor, however, random characters will be printed to the screen in 64 mode.

Additional features of The 64 Emulator are: emulation of the 1764 RAM expansion unit available for the C-64, a monochrome mode that speeds up the operation of many programs and the option of selecting an alternate character set that is easier to read than that of the standard C-64. The program also includes a file transfer utility to copy C-64 disks onto Amiga disks. Another feature worth noting is ►

Product Information

Access-64
Dynamic Software Technologies Inc.
9420 Reseda Blvd., Suite #410
Northridge, CA 91324
818/360-2995
$79.95

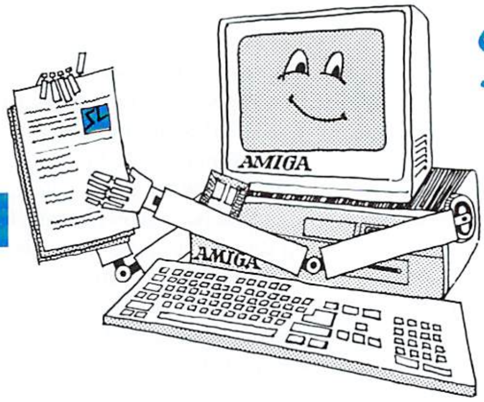
Marketed by:
Progressive Peripherals Inc.
464 Kalamath St.
Denver, CO 80204
303/825-4144

C-View
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723 East Skinner
Wichita, KS 67211
316/267-6321
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Disk-2-Disk
Central Coast Software
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Los Osos, CA 93402
805/528-4906
$49.95

Go-64!
Software Insight Systems Inc.
16E International Drive
East Granby, CT 06026
203/653-4589
$69.95

The 64 Emulator
ReadySoft Inc.
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EMULATING HARDWARE THROUGH SOFTWARE—EVEN ON A 68000—IS A VERY DIFFICULT TASK.

the ability to access the configuration editor utility from within a 64 program by pressing the Control and Help keys simultaneously.

All of the C-64 BASIC commands are supported, as well as the disk drive commands. The keyboard has not been remapped completely, only the ESC, DEL, TAB, Left Amiga, F10 and Backspace keys. This means that there are fewer things to remember when using the Amiga in the 64 mode. The 64 Emulator does support C-64 sound (a real plus), and the original C-64 ROM routines are included (we assume that ReadySoft licensed the ROM routines from Commodore).

Now for reality.

The manual that comes with The 64 Emualtor states: "Due to the nature of The 64 Emulator, some programs will run between two and five times slower than the Commodore 64; others will run at full speed. This slow-down will not be noticeable on all programs." It would be very difficult to find a program where the difference between expected and actual running speeds was not painfully noticeable. BASIC is much slower (FOR/NEXT loop counting to 10,000 took about 57 seconds), graphics are much slower, printing is much slower, everything is much slower.

Another major problem with The 64 Emulator is that it cannot deal well with multiple sprites. They change color, flicker, even vanish. The 64 Emulator does not handle raster interrupts very well either. Considering that most commercial software uses sprites and/or raster interrupts, you can pretty much count on having problems.

The third major problem is that The 64 Emulator will not load programs that use turbo loaders, and there is no way to tell which commercial programs use them until you try to load them.

These are three very large problems and may combine to make The 64 Emulator almost worthless. Again, for programs that do not use turbo loaders, do not use multiple sprites or raster interrupts, and are not graphics-intensive or speed-critical, the 64 Emulator may be a good program. However . . .

HERE'S THE WRAP: WITHOUT THE . . .

C-View lets you use a C-64 monitor. It works well and may be a good investment if you want to postpone buying an Amiga monitor.

Access-64 lets you use the 1541/1571/1581 and CBM serial printers as Amiga peripherals. It transfers files back and forth easily between C-64-format disks and Amiga-format disks. It is not a software emulator and it does not claim to be. Integration of the C-64 devices into Workbench is handled very well. If you have a lot of text files you wish to move from C-64/C-128 disks to Amiga disks (and vice versa), or if you just want to use your existing C-64/C-128 drives for data storage, then this is a worthwhile device.

Go-64! *is* a software emulator that has some major problems. There is no sound. It is very slow. It will not load all programs that use turbo loaders, but the company is working on Hyper-codes that will let you load some of these programs. You must copy ROM routines from another 64 for some programs (a complicated procedure). It does handle sprites and raster interrupts, but the speed limitations may cause the sprites to behave erratically. It is slightly, but not much, faster than The 64 Emulator.

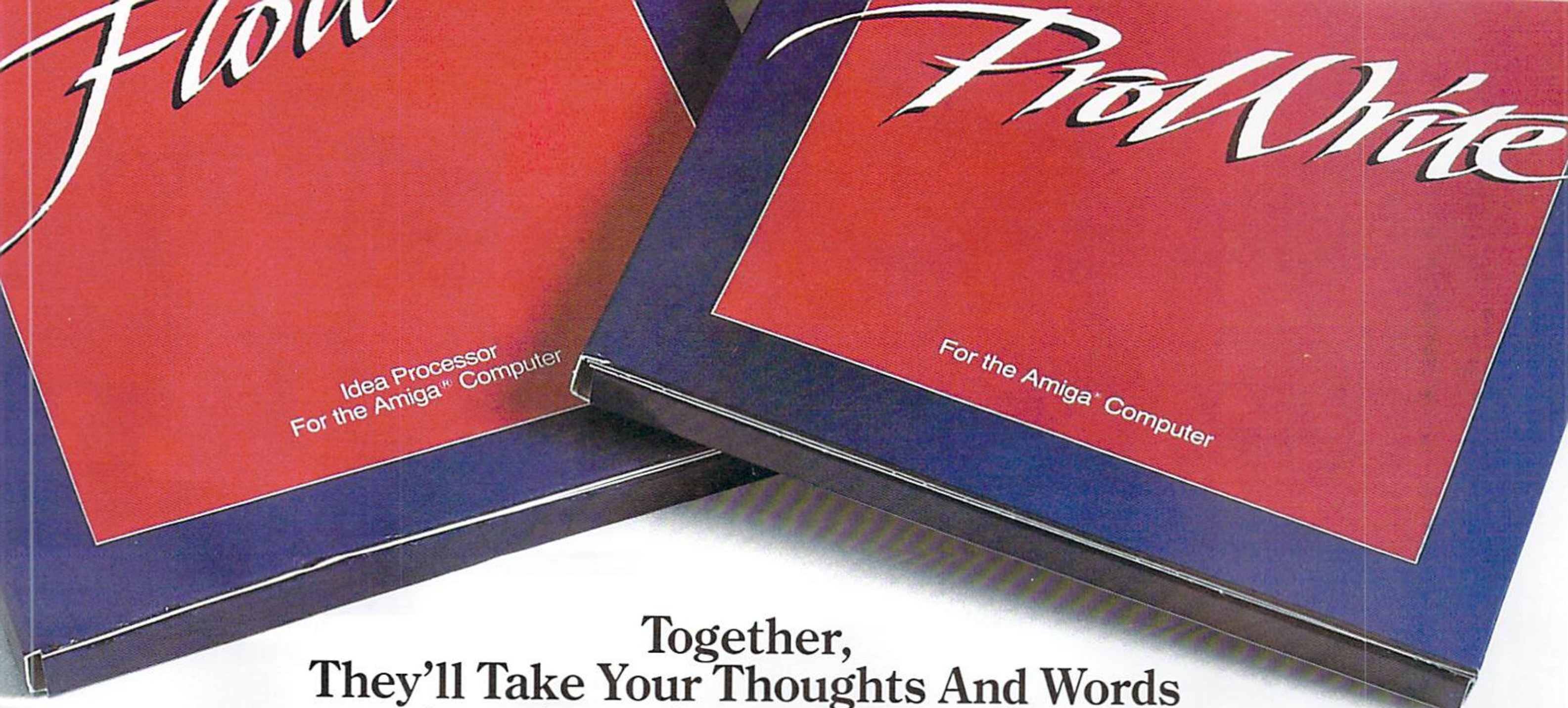
The 64 Emulator is *also* a software emulator and shares some of the problems of Go-64! and encounters some unique ones of its own. It does support C-64 sound. The configuration editor is available from within 64 mode. It contains exact copies of the C-64 ROM routines, so there is no need to copy them from an existing C-64. It is also very slow. It also has trouble with most programs using turbo loaders. Some programs using turbo loaders are supported, but require different versions of The 64 Emulator. It has trouble with multiple sprites and raster interrupts.

Bottom line: C-View is good if you want to use your 1702 monitor. Access-64 is good if you just want to transfer programs or use C-64 drives and printers with your Amiga. Go-64! and The 64 Emulator are about equally useless. Neither one can handle all turbo-loaded software. Both are painfully slow for just about everything. Neither one works well for programs that use graphics or speed-sensitive action. They both are okay (at best) on such software as word processors, databases and spreadsheets—but expect severe speed reductions.

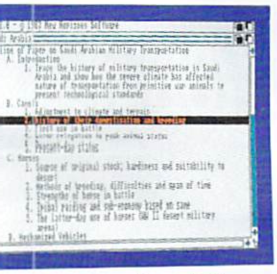
It would be great to say that you can buy an emulator and use your old C-64 software on your Amiga, but it is not completely true. You do not know which programs will work and which ones won't until you try them, and you will be disappointed with the results on the programs that will load and run.

In defense of Software Insight Systems and ReadySoft, a C-64 is a complicated and, in some ways, very sophisticated machine. The 6510 and SID chips are very efficient at what they do, and the software developers who have been working on C-64 software all these years have found ways to make these chips operate far beyond Commodore's original expectations. It is not surprising that trying to emulate hardware through software (even on a 68000) is a very difficult task.

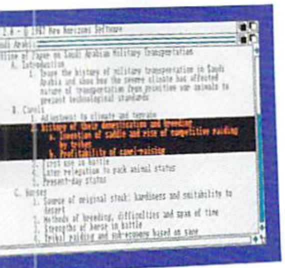
If you want 100% C-64 software and hardware compatibility, keep your old 64. The road from C-64 to Amiga is, unfortunately, still under construction. ■



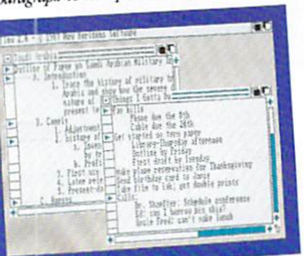
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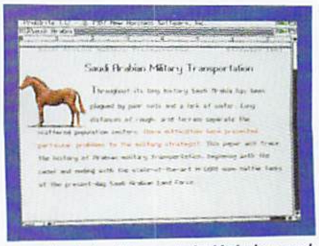
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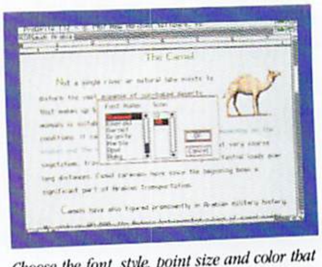
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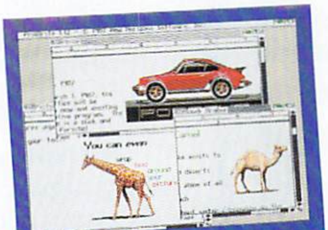
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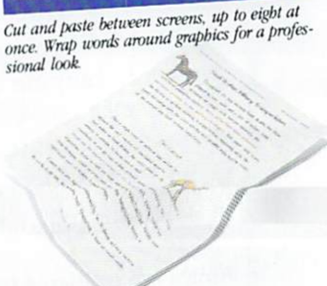


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Swapping Data . . . Clipboard-Style

The Exec's clipboard device can add useful cut-and-paste functions to many of your applications. And our clipboard demo in C will get you started on the right track. **By David T. McClellan**



Smart Amiga owners have long been aware of the potential power of AmigaDOS's kernel. AmigaDOS is built on top of both sophisticated hardware and a workhorse of a kernel—the Exec. (These are system-software routines that control many major functions of the computer.) The Exec has been profiled before (see the ROM Kernel manuals and my own article, "Executive Control: Introduction to the Amiga Kernel," *AmigaWorld* Special Issue Reference Guide 1987), but one of the more useful—and least used—Exec functions is the clipboard.

Neglecting use of the clipboard in the Amiga's multitasking environment seems particularly egregious, because here it is very easy to imagine situations where one running program can cut data to a file and another paste it in, without either program "talking" directly to the other. Apple's Macintosh has a clipboard that has proved to be one of the best ways for two user programs to swap data. The Mac allows one program to write data to the clipboard and another program to read that data from it.

Well, Amiga users needn't worry about the Exec's clipboard languishing in disuse any longer. Notepad for AmigaDOS 1.2 uses the clipboard (run two Notepads simultaneously, and what one cuts, the other can paste). Communications and graphics programs are using it now for sharing chunks of data. Because the Amiga Clipboard supports a standard data format (IFF), an application can find out data type and structure before it reads material from the clipboard. Also new Exec documentation (the "Libraries and Devices" volume of the Addison-Wesley *ROM Kernel Reference Manual* and the *Amiga Programmer's Handbook, Vol. II*) now covers the clipboard (the Addison-Wesley manual even has a sample program). But if heavy reading puts you off, I've written what I hope is a handy little clipboard demo in C to show you how to use it.

As an Exec DEVICE, the clipboard is something you open, read and write, and close just like the Serial or Trackdisk devices. Because several tasks can use the same clipboard, there are also specialized I/O commands that coordinate access to the clipboard by different tasks. There can be more than one clipboard UNIT open, each with its own store of information or space to put data in. The data in a given clipboard can reside in memory—either in a user application's memory (data POSTed but not yet written to the clipboard) or in the clipboard's memory—or on disk. And even though the clipboard is a software device (one you can't see), the data in it can survive reboots and ►

ILLUSTRATED BY KEVIN HAWKES

powerups. This is possible because when all programs that use a particular clipboard unit close the clipboard, the data the unit contains is saved in a special file in the devs/clipboards directory on your Workbench disk. Each clipboard unit gets its own file; the data from unit 0—the clipboard unit that both Notepad and my ClipDemo program use—goes into file "devs/clipboards/0."

Clipboard Data Formats

In order for programs to share data on a clipboard, they must know the type and structure of the data contained in the clipboard. Commodore-Amiga chose to use the IFF (Interchange Format Files) standard for clipboard files. Clipboard files, like other IFF files, are structured. Each consists of one or more "chunks," which consist of header information that tells programs the type and size of the data, followed by the data itself, which can be structured further. Standard IFF formats (or FORMs) exist for bitmap pictures (ILBMs, or interleaved bitmaps), formatted text (FTXT) and simple music (SMUS); more are evolving. Notepad clips are FTXT FORMs, which consist of ASCII text with font and style information imbedded as needed. My clipboard demonstration program processes the most simple type of FTXT data.

The Clipboard device also provides for private data formats, in cases where there is no IFF FORM that fits your data, or where your program will only save data in the clipboard for its own use. The IFF formatting of the clipboard is only requested; it is not required.

Clipboard I/O

The clipboard device is opened with the Exec OpenDevice() call, as in:

OpenDevice ("clipboard.device", unit, clipreq, 0);

The unit parameter is the unit number of the clipboard you are opening; the clipreq parameter is a pointer to an initialized IOClipReq struct (defined in *devices/clipboard.h*—see figure at top of the next column). This struct is similar to the IOStdReq struct I used in the Exec demo in my "Executive

```
struct IOClipReq {
    struct  Message io_Message;
    struct  Device  *io_Device;
    struct  Unit    *io_Unit;
    UWORD   io_Command;
    UBYTE   io_Flags;
    BYTE    io_Error;
    ULONG   io_Actual;
    ULONG   io_Length;
    STRPTR  io_Data;
    ULONG   io_Offset;
    LONG    io_ClipID;
};
```

Control" article cited above, with the addition of one extra field at the end—the io_ClipID. This ID field is used in reads and writes to synchronize multiple cuts and pastes with other applications. (See the OpenClip() routine in Listing 1 for an example of setup and opening.

The CloseDevice() call—CloseDevice (clipreq);—will close an open clipboard. All other I/O to the clipboard is done through the standard device I/O routines: DoIO() for synchronous I/O, and SendIO(), CheckIO() and WaitIO() for asynchronous I/O. The type of I/O done by DoIO() or SendIO() is specified in the IOClipReq passed to the routine; this handles both reads and writes. I will use DoIO() in the following discussions.

After you have opened the clipboard, you can read and write to it as you wish. To start reading, set your IOClipReq struct's io_Command field to CMD_READ, set fields io_Offset and io_ClipID to 0, put a pointer to your buffer in io_Data and to its size and io_Length and call DoIO(). When the DOIO() routine returns, your data will be in your buffer. The IOClipReq's io_Actual field will tell you how much you actually read—if it is less than the number to which you set io_Length, you have read all there is in the clipboard. For each subsequent read of the same data in the clipboard, leave io_ClipID and io_Offset alone and the clipboard device will give you the next sequential chunk of data. When you hit end-of-clip, tell the clipboard you are done by issuing one more CMD_READ with io_Length set to 1 and io_Data to NULL, so other tasks can write to the clipboard again. Once you start reading, all other tasks' writes to the clipboard will wait until you have finished reading all the data in the current clip. See the ReadClip() routine in Listing 1 for an example.

If you wish, you can do "random access" I/O to the clipboard. Set the io_Offset field to a value other than 0 and io_Data to NULL, and the clipboard will "seek" to that byte, ready for your next read. This is one way to skip to the end of a clip (or "cut").

You write to the clipboard in similar fashion to reading to it. Set the io_Command field of your IOClipReq to CMD_WRITE, point io_Data to your data buffer, put its length in io_Length and go to it. For the first write, set io_Offset to 0 and io_ClipID to 0; leave them alone for subsequent writes ►

Clipboard Reference Sources

Amiga ROM Kernel Reference Manual: Libraries and Devices
Addison-Wesley Publishing Co.
Jacob Way
Reading, MA 01867
617/944-3700
$33.95

Amiga Programmer's Handbook, Vol. II
SYBEX Inc.
2021 Challenger Drive #100
Alameda, CA 94501
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$24.95

going to the same "cut" of data. When you have finished writing the current cut of data, consisting of one or more sequential writes, tell the clipboard this set is complete by calling DoIO() with the IOClipReq's io_Command field set to CMD_UPDATE. Other tasks can then read the data. See WriteClip() and the routine that calls it—clip_iff_str()—in Listing 1 for examples of this method.

The clipboard device provides three special I/O commands for special circumstances. If your program has a large chunk of data to cut to the clipboard, or if it has data in a private format, it can tell the clipboard the data is available by using the CMD_POST command in the IOClipReq's io_Command field with a DoIO() call. This does not write the data; it merely tells the clipboard that data is available upon request. When you send the CMD_POST command, you must pass the address of a MsgPort you have created in the IOClipReq's io_Data field with it. This message port will be used later to tell your program when data is being requested. At that time the program will do the CMD_WRITEs to actually cut the data into the clipboard, setting io_ClipID in the IOClipReq to the ID specified in the satisfy message's sm_ClipID field (see below). After a CMD_POST, your program should be ready to receive the satisfy message at any time (include it in your Wait() event flags) and satisfy the request as soon as it comes along. The satisfy message comes to your program in the following struct:

```
   struct SatisfyMsg
{
   struct Message sm_Message;
      /* Message is always 6 bytes */
   UWORD sm_Unit;
      /* Which clipboard unit */
   LONG sm_clipID;
      /* io_ClipID value for writes */
};
```

This operation allows a program to have large sets of data available for sharing, without paying the price of writing them until they are needed. If the satisfy message request never comes, the program never has to write the data.

When you do a CMD_POST operation, DoIO() returns the current Clip ID in your io_ClipID field. You can use CMD_CLIPREADID and CMD_CLIPWRITEID to check on the most recent clips read and written later; if the current Clip ID for writing exceeds that of your post, it is obsolete and can be abandoned.

Demo Program

The accompanying program does simple reads and writes to the clipboard, based on single-letter commands read from the console. It expects to read and write Notepad-style data in the clipboard. I start up Notepad via the Workbench and ClipDemo via the CLI or the Workbench. Then I cut data from Notepad and tell ClipDemo to read it (it will print it in hex and ASCII in case you get something other than text). ClipDemo will then write a string to the clipboard and do a paste in Notepad. It is surprising how easy clipboard I/O is. The utility routines OpenClip(), CloseClip(), ReadClip() and WriteClip() can be reused in other code as you please.

Have fun with it and add clipboard cut-and-paste functions in any new applications you do. ■

David T. McClellan is a contributing editor to AmigaWorld. *Address correspondence to him at 104 Chevron Circle, Cary, NC 27511.*

Listing 1. Clipboard demo program.

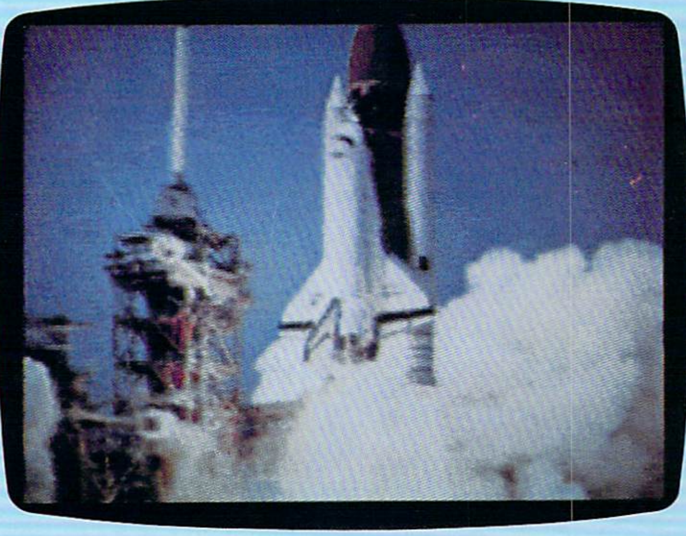
```
/* ClipBoard Reader Demo, February 1988 AmigaWorld
David T. McClellan  Sept. 1987
This program will create its own little window for
user interaction; run it and Notepad at the same
time to cut from the Notepad file for ClipRdr to
read, and clip lines for Notepad to paste.
Compiled with Amiga Lattice C compiler;
Invocation (on AmigaDos 1.2 CLI): clipdemo */
/* Include Files */
#include "exec/types.h"
#include "exec/exec.h"
#include "devices/clipboard.h"
#include "graphics/gfx.h"
#include "graphics/gfxbase.h"
#include "libraries/dos.h"
#include "libraries/dosextens.h"
#include "stdio.h"
/* Some DEFINEitions */
#define DFLT_NLINES  8 /* Default number of lines
for  show_buf() to display at one time. */
/* Type-of-write designators for WriteClip
   (its definition is below) */
#define WCLIP_FIRST_WRITE 0 /* First write of set */
#define WCLIP_CONT_WRITE 1  /* Continuation write */
/*   not last.  */
#define WCLIP_LAST_WRITE 2 /* Last write of a set:
done with "cut" operation. */
/* Cleanup Defines and Longword - for my standard
close-up-shop routine */
#define CL_GFXLIB  0x0001 /* Close graphics lib */
#define CL_CONSOLE 0x0002 /* Close console */
#define CL_CLIPDEV 0x0004 /* Close clipboard */
long closeflags = 0; /* Close-up-shop flagword */
/* Library BasePtrs */
struct GfxBase *GfxBase;
/* File handles and IO Requests */
int cons; /* Console file handle */
struct IOClipReq *clipreq;
  /* Clipboard i/o struct */
/* Hex digit -> char values for show_buf() */
char hextab[16] =
{ '0', '1', '2', '3', '4', '5', '6', '7',
  '8', '9', 'A', 'B', 'C', 'D', 'E', 'F' };
/* Function Declarations */
   /* Amiga Functions */
int OpenDevice();
struct MsgPort *CreatePort();
APTR AllocMem();
APTR OpenLibrary();
int Open();
   /* My Own Functions */
struct IOClipReq *OpenClip(); /* Open a clipboard */
```

Listing continued on p. 90

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The Numbers Game

No, the "sheets" discussed here are not for playing the numbers or the ponies, but if you need number crunching power, here's the "dope" on four spreadsheet programs for the Amiga.

By William B. Catchings and Mark L. Van Name

SPREADSHEET PACKAGES HAVE played an important role in the development of personal computers. It is difficult to discuss the Apple II without mentioning VisiCalc, or the IBM PC without Lotus 1-2-3. While Apple's Macintosh made its early impact primarily with its graphic abilities, one of its best-selling software packages is a spreadsheet, Microsoft's Excel.

The Amiga sold initially because of its powerful color graphics and sound capabilities. Many of these early users did without a spreadsheet package, although almost everyone, including artists and musicians, can use one. As the Amiga community expands, solid business software is a must. Happily, there are many Amiga spreadsheet packages available today.

In this column we will take a quick look at four: Logistix from Grafox, Haicalc from Haitex Resources, Analyze! from Micro-Systems Software, and MaxiPlan Plus from Oxxi. Owing to space limitation, we cannot review these products exhaustively. Instead, we will try to give you a flavor for Amiga spreadsheets in general and the operation of these four in particular.

The Post Post Parade: Introducing The Field

Like most spreadsheets, all four of these products follow the standard cell numbering scheme—letters for columns, numbers for rows—and spreadsheet model established by VisiCalc and 1-2-3. Logistix and Analyze! use / commands like those of 1-2-3. They also share many commands with 1-2-3, but none of them is compatible with 1-2-3. For example, Logistix has a /g (for global) command that 1-2-3 does not. If you are familiar with 1-2-3, you will probably find this similarity a mixed blessing. It makes it easy for you to get going, but the differences will often prove frustrating.

Haicalc also offers / commands, but they are not compatible with 1-2-3. You can execute these commands either by typing or by picking them from standard Amiga menus. MaxiPlan Plus makes no attempt at 1-2-3 command compatibility.

You will quickly find that none of these spreadsheets allows you to work on any really large worksheet if you have only 512K of memory on your Amiga. For serious work you need at least 1MB of memory, and more is better. Haicalc, which uses a sparse matrix data storage model and provides the fewest features and functions, is the least memory-intensive. Its documentation claims that on a 512K Amiga you can have 2,900 cells of 50 characters of text each.

All but MaxiPlan Plus claim to work in ►



Four spreadsheets now available for the Amiga.

512K and definitely do: That's all the memory we allowed on our benchmark system. Even MaxiPlan Plus, which requires 1MB, worked fine on small worksheets in 512K. All of them will also be right up against the wall in that amount of space. For example, on a 512K Amiga, Analyze! could not handle a 25 × 25 worksheet, while Logistix used over a quarter of its available memory on our benchmark worksheet. In addition to the extra memory, a hard disk is almost mandatory if you plan to use large worksheets regularly.

While not an issue for those who use only Amigas, the ability to access data from spreadsheets on other systems is crucial for many users. The most widespread office combination is Lotus 1-2-3 on an IBM PC or compatible. People often want to be able to work on their spreadsheet data at home as well as in the office. To do this you first must get the data onto a disk that the Amiga can read. If you do not have an Amiga 5.25″ disk drive, you typically can accomplish this by using a data transfer program, such as Kermit, or by using a package that moves data between the different operating systems, such as DOS 2 DOS from Central Coast Software.

Once you have the data on an Amiga floppy, however, you have to be able to use it. Fortunately, all of these products except Haicalc can import data from a 1-2-3 spreadsheet. Saving the results of your work in a form you can take back to the office is another matter: Only Analyze! can write worksheets in 1-2-3's format.

Handicapping the Contenders: Performance

Enough about working with other systems. Let's get to the question everyone always asks: How fast are these products?

To answer this question, we timed three common operations: loading a worksheet, storing a worksheet and doing a recalculation. Our test worksheet was 25 columns by 16 rows. Cell A1 was a constant, while every other cell was a simple calculation: A1*1.1. We loaded and saved all data in the format native to each package. Our test system was an Amiga 1000 with 512K of memory and two disk drives, one holding the product and one holding the data disk. We timed all three packages with a watch, and all results are the average of three timings. We considered the operation to last until the screen was finished updating. Table 2 gives the results of these tests.

The news is neither particularly good nor bad. All are bearable, but none are as fast as we had hoped. Analyze! turned in the fastest recalculation time, beating the others by a factor of two. Logistix won the other two tests. MaxiPlan Plus is the slowest package, although it would be about the same as the rest if it did not perform a mysterious and seemingly unnecessary second screen repaint after the operation seems to be done.

Each product has some interesting aspects beyond its performance and the general data in the tables. We briefly discuss each one below, in alphabetical order by company name.

Logistix

You encounter the most annoying thing about Grafox's Logistix the moment you try to use it: It is the only copy-protected product. It uses a dongle for copy protection, which is one of the least offensive techniques, but nonetheless we wish that software companies would abandon copy protection once and for all. The dongle is a small device that you attach to the second mouse port and which contains a piece of data that the program checks when it starts. This seems harmless enough, but it could be a problem for users who normally have a clock or joystick connected to that port.

Logistix is a large, serious package. Its maximum worksheet size is not as large as MaxiPlan Plus allows, but its 1,024 columns by 2,048 rows is enough for almost everyone. Its manual contains over 400 pages and a decent index, so while there is a lot to read, you can find what you're looking for fairly easily. Oddly, it provides not only the spreadsheet and complementary graphing capabilities that you expect in a modern package, but a project management function as well. Almost half of the manual is devoted to this capability. If you need PERT or GANTT information as well as a spreadsheet, this is a great combination. For most of us it is just an interesting sidelight.

Logistix provides over 70 functions, including all of those standard for arithmetic and trigonometry. It also offers a good set of financial functions, including ►

Table 1. Features and Functions of Four Amiga Spreadsheets.

Product	Logistix	Haicalc	Analyze!	MaxiPlan Plus
Version we tested	1.1	1.7	2.0	1.8
Price	$149.95	$59.95	$149.95	$199
Max. worksheet size (columns × rows)	1024 × 2048	9000 × 9000	none given	512 × 65,530
Number of math functions (approx.)	70 +	4	40 +	70 +
Macros	Yes	No	Yes	Yes
Graphing abilities	Yes	Yes	Yes	Yes
Reference card	Yes	No	No	No
Key Template	Yes	No	No	Yes
Copy Protected?	Yes	No	No	No
Import 1-2-3 data	Yes	No	Yes	Yes
Export 1-2-3 data	No	No	Yes	No
Standard filename extension	.lgx	none	.sht	.plan
Number of diskettes in distribution	2	1	1	2
Customer support number in manual?	Yes	Yes	Yes	Yes

Table 2. Benchmark Results for Three Standard Spreadsheet Functions (in seconds).

Product	Logistix	Haicalc	Analyze!	MaxiPlan Plus
Worksheet Load	6	6	7	12
Worksheet Store	5	6	8	15
Recalculate	4	3	2	5

PV (Present Value), NPV (Net Present Value), FV (Future Value), PMT (for loan "PayMenT" calculations) and IRR (Internal Rate of Return).

Beyond these computational functions, it also contains an excellent macro language and very strong graphing capabilities. You can produce a wide variety of graphs, among them a number of types of pie charts, bar charts, line graphs and scatter and area plots.

Logistix also provides the best ability to import data from other packages. Its manual contains a chart that shows how its functions correspond to those of 1-2-3 and SuperCalc. It can import data from files written by several non-Amiga packages, including dBase, 1-2-3 and SuperCalc, as well as DIF text and ASCII files that contain fields separated by commas. It can also export data into the latter two formats.

Some of this strength at working with other packages undoubtedly comes from the fact that Logistix was first developed for MS DOS and then ported to the Amiga. Unfortunately, this background has led to a peculiar mixture in the user interface. It uses / commands like 1-2-3 but is not fully compatible with that program. You can manipulate windows with the mouse, and it works within the standard Amiga multitasking environment. To move around on the worksheet, however, you must use the arrow keys, not the mouse. Such odd combinations often make it frustrating to use.

Overall, this is a solid, powerful product with good documentation. It is not integrated as well with the Amiga as it should be, and the dongle used for copy protection is nothing but a pain. Beyond these problems, however, Logistix is an awful lot of power for a very reasonable price. As is true of most of these packages, Logistix offers more power for your dollar than the vast majority of IBM-PC spreadsheet products.

Haicalc

Haicalc is a basic spreadsheet program that was designed for the Amiga and uses its interface well. You can execute all of its commands from standard Amiga menus, run it in a multitasking environment and even set the font to be used by each cell. It uses a sparse matrix storage scheme and dynamic cell allocation to manage memory efficiently. It can produce bar, line, point and pie charts. It also costs less than half as much as any of the other products.

Unfortunately, there is a lot of bad news to go with the good. Haicalc has a long way to go to become a serious spreadsheet program. It has only four math functions: SUM, MAX, MIN and AVG. It cannot import or export data from 1-2-3. It also has some odd rough edges. For example, if the window is full, you can use the cursor to scroll to the left but not to the right. To move to the right you have to use the Goto command. You can copy formulas, but you cannot make cell references in formulas absolute.

It also does not always act as a unified product. You can build graphs, but you must first start Haicalc and then start a graph program (Pie or Bar, for example). You cannot print these graphs from the program; instead you must use a screen-printing utility.

If you need large but unsophisticated worksheets, or if you want a product that is simple and easy to learn, Haicalc could be a bargain. If you need to do any serious spreadsheet tasks, it probably will not be up to the job.

Analyze!

Analyze!, from Micro-Systems Software, is a powerful product that does not offer quite as much as Logistix but provides a great deal more than Haicalc. It states no maximum spreadsheet size, so memory is probably the limit. Sporting a 220-page manual, Analyze! offers documentation that is thorough and complete, with decent tutorials and a reasonable index. It offers over 40 functions, including all of the standard arithmetic and trig ones, as well as all of the standard financial functions we mentioned earlier except IRR.

Analyze! also provides a reasonable set of the "extras" that modern spreadsheet users have come to expect. Its macro capability is sufficient for most users. Its graphing functions include bar charts and stacked bars, pies, line graphs and 3-D bar charts.

Analyze! is one of the nicer results of trying to achieve a basic compatibility with 1-2-3 while at the same time preserving the essential flavor of the Amiga. For example, its functions start with the 1-2-3 @ prefix, and a great many of its / commands are compatible with those of 1-2-3. It is also the only one of the group that can both read and write files in 1-2-3 format. At the same time, its good use of the mouse for moving around and ►

Product Information

Logistix
Grafox Limited
65 Banbury Road
Oxford OX2 6PE
England
Tel: Oxford (0685) 516281

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marking cells on the spreadsheet, the handy scroll bars and other niceties give it an Amiga feel.

Analyze! is a good, middle-of-the-road package. While not as powerful as Logistix or MaxiPlan Plus, it offers a solid set of capabilities and a nice combination of the 1-2-3 and Amiga user interfaces.

MAXIPLAN PLUS

MaxiPlan Plus, now from Oxxi, is the newest incarnation of the MaxiPlan product that was once marketed by MaxiSoft. It is a dramatic improvement over previous versions. As we mentioned earlier, Oxxi states that MaxiPlan Plus requires 1MB of memory (although we were able to use it on small worksheets in 512K). The company does, however, offer a version specifically for a 512K Amiga—MaxiPlan 500—which omits a few capabilities (notably macros) and is $50 cheaper.

Like Logistix, MaxiPlan Plus is chock full of features. The approximately 300-page manual is well-written, complete and contains many useful tutorials. It offers over 70 functions, including all of the standard arithmetic, trig and financial ones. You can import 1-2-3 files with a utility that is included. It has a powerful macro language. You can produce a variety of graphs, including many types of bar and pie charts, scatter charts and line graphs, with the area beneath the line shaded or not. One particularly nice touch is the ability to store or retrieve your charts in IFF files that many other Amiga programs can then manipulate.

This ability is indicative of where MaxiPlan Plus really shines: It is integrated into the Amiga environment far better than any of the other products. It abandons any real degree of 1-2-3 compatibility and works beautifully with the standard Amiga desktop model. You gain access to commands from pull-down menus, move around the spreadsheet and mark areas with the mouse, and use scroll bars to see other parts of the worksheet. You can even enter formulas by using the mouse to point to the appropriate symbols.

Also, although you may at first wonder why, it talks. It can repeat your formulas or your keystrokes as you type them. Perhaps more usefully, it can read back to you sections of a worksheet, so that you can check your data entry without looking up from the original sheet of paper.

If you don't care about being compatible with 1-2-3 and want a product that works well with the Amiga, this is probably your best bet. Its only real drawback is performance; while still useable, it is definitely the slowest of the bunch.

OUR PICKS

For maximum power, buy either Logistix or MaxiPlan Plus. If you need the 1-2-3 feel, go for Logistix; MaxiPlan Plus is the obvious choice for the hardcore Amiga user who needs a lot of functions. Haicalc can also give you the Amiga look and feel, but only if you can live with its minimal capabilities. Analyze! is a reasonable blend of the two user interfaces, but is not quite as powerful as Logistix or MaxiPlan Plus. Whatever your choice, we think that you will find, as we have, that powerful spreadsheets for the Amiga are here today. ■

Mark Van Name and Bill Catchings are contributing editors to AmigaWorld. *Write to them at 10024 Sycamore Road, Durham, NC 27703.*

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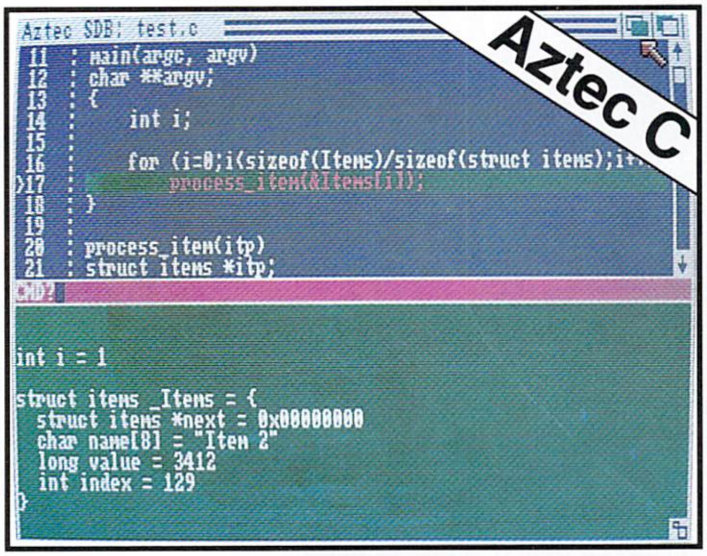
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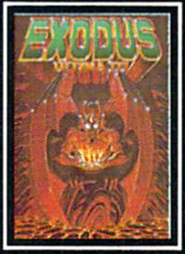
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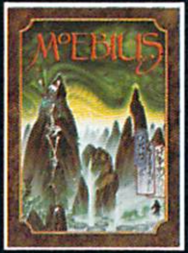
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BASIC By The Numbers

Part II of our tutorial on Amiga Basic programming will send you for a loop!

By Bob Ryan

9 Go With the Flow

COMPUTER PROGRAMS execute one line at a time, one line after another. This top-to-bottom execution of program lines is called the flow of control of the program; the line currently executing is thought of as controlling the computer. When a line finishes executing, it passes control to the next line in the program—most of the time.

The following program shows how program control passes from one line to the next. Enter it into your computer and run it.

```
PRINT "Line 1 is in control"
PRINT "Now line 2..."
PRINT "Then 3..."
PRINT "And 4"
PRINT "And finally 5"
END
```

This simple program demonstrates how a program steps through a listing, executing one line at a time, one line after another.

10 Looping Mania

LET'S SAY YOU had to write a program that adds a pair of numbers input from the keyboard and prints the result. It is not a very difficult program, a couple of INPUT statements and a PRINT statement does the trick (see section 6 of last month's column, p. 22). Now suppose you have to write a program that will add ten pairs of numbers input from the keyboard and print the sums of each pair. Do you need twenty INPUT statements and ten PRINT statements? Suddenly, writing programs that deal with thousands of numbers looks like a lot of repetitious work.

Luckily, you can let the program do the repetitious work by getting it to reuse program statements. You do this by changing the normal flow of control of a program. The simplest way to change the flow of control is with the GOTO statement. Try the following program:

```
REM Loop Demo
Start.Loop:
  INPUT "X";x
  INPUT "Y";y
  PRINT x + y
GOTO Start.Loop
END
```

Without the GOTO statement, this program would get two numbers from the keyboard, print the results in the output window and end. The GOTO statement, however, changes the normal top-down flow of control by sending control back up to Start.Loop. Once at Start.Loop, the program executes the program lines one after another until it gets to the GOTO once again and jumps back up to Start.loop. The program never gets to the END statement. You may be wondering what Start.Loop does. The answer is nothing. Start.Loop is a label; it gives the GOTO statement a place to go to. (I made up the name Start.Loop.) Many versions of BASIC require that every program line be preceded by a line number that acts as a label to that line. With Amiga Basic, you need label only those lines that you have to jump to at some point.

The Start.Loop label and the GOTO statement mark the beginning and end of a control structure, a block of statements that change the normal flow of control in a program. As its name implies, Start.Loop marks the beginning of a loop structure where program control flows to the bottom only to loop back to the top. In fact, Start.Loop begins an infinite loop—there is no way to get out of the loop from inside the program.

11 Decisions, Decisions

YOU DO NOT find too many instances where an infinite loop is a useful thing to have in a program. Much more useful are control structures where you determine how many times the program goes through a loop and under what conditions the program exits the loop. Such structures are common in Amiga Basic programs because of the ability of programs to make decisions.

Using the program from the preceding section, substitute the GOTO statement with IF y <> 999 GOTO Start.Loop and run the program. It will run as before until you get to the IF...GOTO statement. This statement tests the last number you entered for the y variable. If the number does not equal 999, then the program loops to Start.Loop. If y does equal 999, the program falls through to the END statement. IF...GOTO statements let programs make decisions.

The IF...GOTO statement is a specific form of the IF...THEN statement. ►

You use IF. . .THEN statements to choose between two courses of action. An IF. . .THEN statement has two parts. The "IF" part sets up a test. In our case, the program tests to see if the value of the y variable is not equal to the number 999. If the result of the test is true—y is not equal to 999—the "THEN" part of the statement is executed. If the result is false—y is *not* not equal to 999 (in other words, y *is* equal to 999)—control passes to the statement following the IF. . .THEN statement.

The "IF" part of an IF. . .THEN consists of a Boolean expression, meaning that the expression must be either true or false—no fine shades of distinction in the computer world. The expression can test for more than one condition, but the result must be true or false. For example, we could have tested both the x and y variables for 999 with the following statement:

```
IF (x <> 999) AND (y <> 999) THEN Start.Loop
```

In this case, if both x and y are not equal to 999, the expression is true and the program jumps to the Start.loop label. If either of the variables equals 999, the expression is false and control proceeds to the next line of the program. We have barely touched upon the wealth of options avaiable with the IF. . .THEN statement. For instance, instead of just moving to the next program line in the event of a false result, you can specify an ELSE clause to execute when the conditional expression is false. Also, the THEN (true) and ELSE (false) clauses do not have to be single statements; they can consist of blocks of statements. In addition, you can nest IF. . .THEN statements inside the THEN and ELSE blocks of another IF. . .THEN statement. The possibilities are detailed in the Amiga Basic manual, but to see if you get the idea, examine the following listing and try to determine the output you would get if you entered and ran the program.

```
REM IF. . .THEN Quiz
num1 = 5
num2 = 7
num3 = 10
IF num1 + num2 = num3 THEN Label.1
IF num1 + num1 = num3 THEN
  PRINT "Once upon a time"
  IF 2 * num1 = num2 THEN
    PRINT "there was a little program"
  ELSE
    PRINT "there was a control structure"
  END IF
  PRINT "that was quite complicated"
ELSE
  IF num3 - 3 = num2 THEN
    PRINT "and no one could understand it"
    PRINT "so it looped forever"
  ELSE
    PRINT "but it certainly served a purpose"
  END IF
ENDIF
Label.1:
  IF num3 = (2 * (num2 - num1)) THEN
    PRINT "but because of complications"
    PRINT "it never found the END"
  ELSE
    IF num3 = (num1 * num2) - 15 THEN
      PRINT "when it met an untimely end"
    ELSE
      PRINT "but you could figure it out"
    END IF
  END IF
PRINT "If you thought like a computer."
END
```

The output of this program is printed at the end of this article.

12 We R in Control

AMIGA BASIC HAS two primary loop structures; FOR. . .NEXT loops and WHILE. . .WEND loops. You use FOR. . .NEXT when you know, or can calculate in the program, how many times you will have to go through the loop. FOR. . .NEXT loops are used primarily to access data stored in arrays. (More on arrays next month.) You use WHILE. . .WEND loops when you are not sure how many times you will have to go through the loop. WHILE. . .WEND loops are the general-purpose Amiga Basic loops.

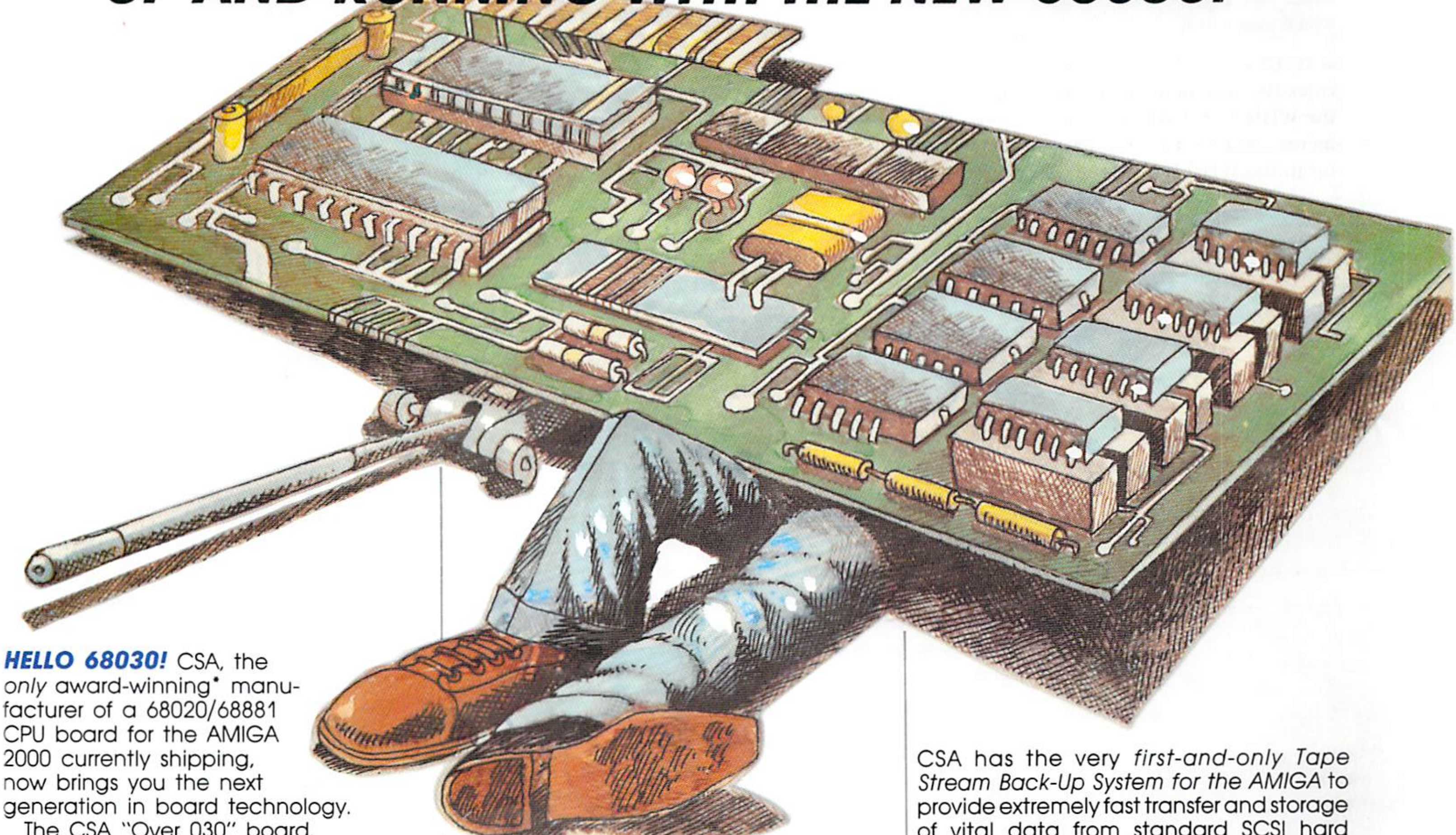
All the work in a FOR. . .NEXT loop is done in the FOR statement, which looks like this—FOR x = 1 TO 1000. The x (which can be any variable) is assigned the first value (1 in this case, but you could use any constant, variable or expression). The value after the TO is the ending condition. The loop works by executing the statement or statements between the FOR statement and its corresponding NEXT statement until the value of x equals 1000. Here is a FOR. . .NEXT loop at work:

```
FOR Z = 5 TO 25
  squareZ = Z * Z
  PRINT Z,squareZ
NEXT Z
END
```

This program prints all the numbers and their squares between 5 and 25, inclusive. Z starts with a value of 5. Each time the loop gets to the NEXT statement, the value of Z is incremented by 1 and the program jumps to the FOR statement. Here the program tests to see if Z is equal to 25. If it is, the program executes the statement in the loop one last time and then continues with the statement following the NEXT statement. If Z is not yet equal to 25, the program jumps to the FOR statement again.

WHILE. . .WEND loops also set up an ending condition at the top of the loop, but the condition can be more general than in FOR. . .NEXT loops. Here are some exam- ►

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ples of WHILE statements:

```
WHILE x = 5
WHILE name$ = "BOB"
WHILE counter <> highend
WHILE NOT EOF(1)
WHILE total > 1000
```

A WHILE. . . WEND loop executes the statements between the WHILE and WEND statements until the condition set up in the WHILE statement is false. The program then continues execution on the line following the WEND statement. Here is a WHILE. . . WEND loop at work:

```
Counter = 0
Number = 1
WHILE NumSquared < 1000
  NumSquared = Number * Number
  Counter = Counter + 1
  Number = Number + 1
WEND
PRINT "The number of perfect
  squares under 1000 is ";Counter
END
```

This program counts the number of perfect squares among the numbers from 1 to 1000 by counting the number of times the WHILE. . . WEND loop is executed. (The statement Counter = Counter + 1 is a standard way to count things in programming.) The condition for continuing the loop is if the square of the current number is less than 1000. When this condition is false, the loop ends. Note that if the condition is false when the program first hits the WHILE. . . WEND loop, the statements inside the loop will never execute.

13 Getting Down to Cases

BOTH TRUE BASIC and the Absoft AC/BASIC Compiler have more control and looping structures than Amiga Basic. True BASIC has structures called DO loops that check for an ending condition both at the beginning of the loop (a DO. . . WHILE loop) and at the bottom of the loop (the DO. . . UNTIL loop). You can even attach conditions to the top and bottom of the same loop. Here's an example of a DO loop that checks for the ending condition at the bottom of a loop:

```
REM True BASIC loop
PRINT "Input a number between 1
  and 10"
DO
  INPUT x
LOOP UNTIL (x >= 1)
  AND (x <= 10)
END
```

This program will loop until the user inputs a number that is greater than or equal to 1 and is less than or equal to 10. The point of a loop that checks the ending condition at the bottom rather than the top is that the loop is always executed at least once. Because it offers a choice between checking conditions at the bottom as well as the top of a loop, True BASIC is more flexible than Amiga Basic regarding control structures.

Both True BASIC and the AC/BASIC compiler support the SELECT CASE statement. Let's suppose you have a program that allows the user to perform one of four arithmetic functions on two numbers. You would first have the user input the numbers; then, you would have him indicate the operation you wanted to perform. You could either test for the operation with a series of IF. . . THEN statements, or you could use the SELECT CASE statement. Here's how the program might look:

```
REM SELECT CASE for
REM True BASIC and
REM AC/BASIC
INPUT "Number 1 "; x
INPUT "Number 2 "; y
Label.1:
PRINT "Enter the operation:
  + - * / "
INPUT op$
SELECT CASE op$
  CASE "+"
    PRINT x + y
  CASE "-"
    PRINT x - y
  CASE "*"
    PRINT x * y
  CASE "/"
    PRINT x / y
  CASE ELSE Label.1
END SELECT
END
```

The program matches the value of the variable in the SELECT CASE statement with the values of the expressions following the individual CASE statements. When the two match, the statement or block of statements following the CASE statement are executed. The CASE ELSE statement is a catch-all just in case none of the other CASEs fit. In the example, the CASE ELSE returns to the INPUT statement because the user obviously did not enter one of the allowed operators.

Although you can simulate the CASE SELECT statement and DO. . . UNTIL in Amiga Basic, it is not the same as having them built into the language. If you find the structures built into Amiga Basic too limiting, you can always move up to True BASIC or AC/BASIC.

14 In the Pipeline

NEXT MONTH I'll talk more about variables and arrays, and begin examining the Amiga Basic graphics commands. The output from the IF. . . THEN quiz program is as follows:

```
Once upon a time
there was a control structure
that was quite complicated
but you could figure it out
if you thought like a computer.
```

Did you get the same results? If you didn't, enter the listing and step through it. Nested IF. . . THEN statements are powerful, but they can also be very tricky.

Send your questions and comments to Basic By The Numbers, AmigaWorld, *80 Elm St., Peterborough, NH 03458.* ■

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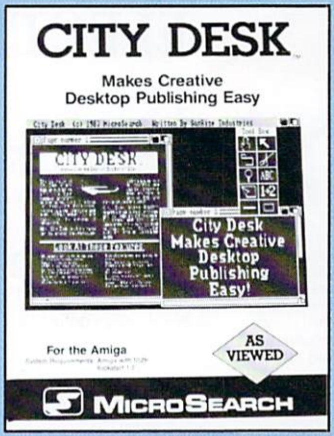
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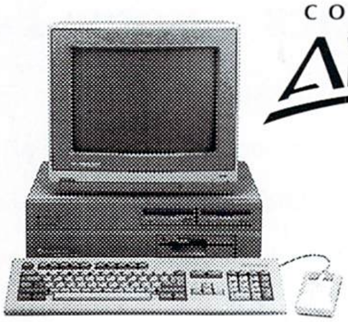
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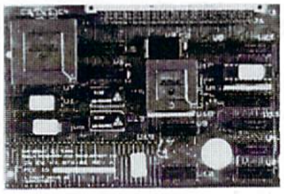
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REVIEWS

AudioMaster

If you don't like what you hear, change what you see.

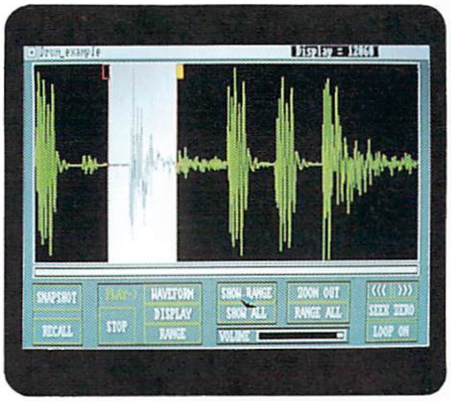
By Stephen Quinzi

AS ANY SOUND designer will tell you, a system's editing, not sampling, capability is the real test of it's power. In this department, Amiga samplers have been weak, until AudioMaster, the software sampler/sample editor from Aegis Development. The most powerful Amiga sample editor I have seen, AudioMaster offers some editing features which previously were available only on high-priced sampling systems.

You can enter sounds to edit either by loading sound files from disk or sampling your own. The program loads IFF and Sonix files in their original format, but treats all others (such as the SoundScape format) as raw data. To sample with AudioMaster, you'll need a hardware digitizer which plugs into either the parallel or joystick port. I used a Perfect Sound parallel digitizer from SunRize Industries ($89.95).

While the sampler offers both a high and low sample rate, the actual rate depends upon which type of digitizer you're using. With a parallel digitizer, the sample rates are 8,363 and 19,886 samples per second, resulting in maximum bandwidths of approximately 4kHz and 10kHz respectively. With a joystick device, the rates are 8,363 and 14,914 sps, with maximum bandwidths of 4kHz and 7.5kHz. A slider adjusts the sample size, the maximum being the amount of available memory. With a 512K machine and a parallel sampler, the maximum sample size is 230K, resulting in a maximum sample length of 27.5 seconds at the low sample rate, and 12.5 seconds at the high rate. For larger samples, AudioMaster recognizes expansion memory. To check for input distortion, a real time oscilloscope monitors incoming data; however, it sends a signal through to the audio output. To avoid feedback, unplug or turn down the Amiga's audio monitor.

Once sampled or loaded, sounds are displayed in the Edit window. The window's cursor acts as a marker, but I would like a time line as well. A time line helps you keep track of things, especially when you're dealing with a large sample. At the bottom of the screen is the control panel, for manipulating the display and playback of a wave. Click on Show Range to zoom in for detailed work or Zoom Out to see the whole wave. A zero crossing finder facilitates looping.



Mark a section of the wave and zoom in.

You can cut and splice waveforms together easily. After defining part or all of the wave as a range, select an edit command (Cut, Copy, Paste or Replace). Edit Freehand allows you to draw your own waveforms; however, I found this function to be very inefficient. Since the waveform is displayed as a series of very fine dots, I couldn't always tell what I was actually drawing. The temporary save command, Snapshot, is a savior since all of the editing opertions are permanent. By taking a snapshot before editing, you later can recall the original if you're unsatisfied with the changes.

Improve Reality

AudioMaster offers some interesting special effects. Echo repeats a specified range of the wave; you control the echo rate, decay rate and number of echos. Backwards plays a designated range backwards. Mix Waveforms combines the waveform displayed in the window with whatever is being held in the copy buffer. For a flanging effect you can adust the pitch and volume of the buffered data. The Change Volume effect is like a two-stage (ramp up and ramp down by percentage) dynamic envelope generator, but is much more powerful than a conventional four-stage Attack-Decay-Sustain-Release generator. Since it acts within a specified range, you can apply it to either a small part of the wave, the entire wave or to several portions of the wave. By applying different ramp slopes to different sections of the wave, you can design complex multi-stage envelope shapes. While the Low Pass Filter removes high frequency noise, its only settings are on and off, and to my ears the slope sounds a little too steep. A variable filter would be more useful.

For integrating your samples into a musical score, you can tune and resample waveforms to a different pitch. To conserve memory, resample existing samples to a lower rate. The manual claims that this does not affect the sound, but I heard a significant degradation in the fidelity of a voice sample after resampling from a 20K to an 8K rate. ►

Once you've created the most melodic (or cacophonic) sound known to man, you can save it in Sonix or IFF format. While saving, AudioMaster automatically converts the files to the low sampling rate, the speed most music programs use. If you need to maintain higher fidelity, HiFi Save will store the sound at its original high rate. Although the manual doesn't mention it, you *must* save all data to a separate data disk. If you try to save too much to the program disk, AudioMaster will trash the disk, erasing the disk validator. The same applies to Snapshot; unless you direct it elsewhere, it saves to DF0: by default.

The Report Card

Although I expected more from AudioMaster, the program does what it is supposed to do and, save for a few exceptions, does it well. The mouse-driven program is solid, easy to use and not copy-protected. The manual is fairly clear and well written; however, I think the telephone tech-support specialist could be more knowledgeable. Personally, I would include stereo sampling, panning and MIDI implementation on future updates or utilities, but even as it is, AudioMaster passes the editing power test with high marks.

AudioMaster
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512K required.

Multi-Forth

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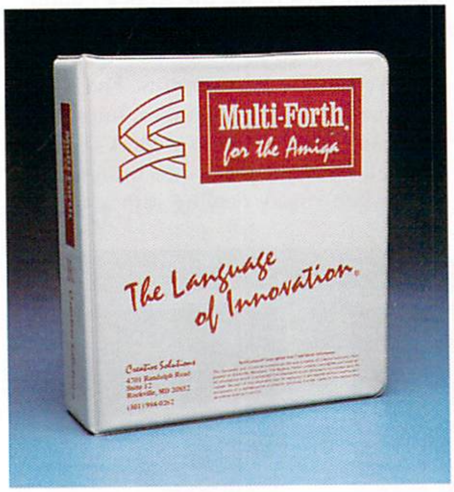
FORTH and conquer.

By R.B. Trelease, Ph.D.

VARIOUS PUNDITS have labeled FORTH "arcane," "inscrutable" and "indecipherable," and FORTH programmers frequently seem to have a public image that combines rugged-individualism with devoted eccentricity. Despite such popular misperceptions, organizations like G.E., Boeing and Kodak have used FORTH as an industrial secret weapon for rapid development of microcomputer hardware systems.

Creative Solutions Inc. (CSI), masters of 68000- and UNIX-based FORTH systems, now brings this exceptional programming tool set to the Amiga with Multi-Forth. While Multi-Forth provides high-level access to many complex native hardware and Intuition functions, the best way to appreciate what the program offers is to consider a few things about FORTH in general.

In formal terms, FORTH is an extensible, threaded, interpreted/compiled programming language system that uses stack-oriented, post-fix operations. In practical terms, FORTH words (subroutines and programs) execute a thread of jumps to other words (named subroutines) composing the working dictionary.



For those who need speed and expandability.

Post-fix (reverse-polish) notation requires that operands be placed on the stack prior to calling operators (4 5 +), as opposed to typical infix (algebraic) notation (4 + 5).

Although FORTH is very rapid on execution and suited to real-time control of system hardware and peripheral functions, the key to FORTH's power is its extendability. You can extend the system's functions by defining new categories of run-time words and adding them (compiling) to the dictionary. In this way, you can use FORTH to emulate LISP, implement a database management system, control equipment or perform conventional program tasks. From this point of view, FORTH has been dubbed a roll-your-own language—if you'd like new system functions, add a new application vocabulary extension.

Muti-Talented

Multi-Forth offers most of the math (byte, word and integer), logical, program control, file support and computational functions provided by typical FORTH-79 standard PC systems. Multi-Forth is *not*, however, a true superset of the FORTH-79 vocabulary. In contrast with the indirect-threaded code employed by typical PC-based FORTH systems, Multi-Forth uses "tokenized" direct-threaded code subroutines in its words. Header and code body portions of Multi-Forth words are located in separate vocabulary and object fields in memory. 32-bit numbers appropriate to the 68000 CPU perform mathematical and address operations. A single precision floating-point arithmetic extension is also provided.

Above and beyond this, the basic Multi-Forth vocabulary includes extensive support (words) for AmigaDOS and Intuition system calls, with numerous words for window, gadget and bit-map graphics management. The system supports full access to Amiga ROM library functions, sound drivers, I/O redirection and a window/printer debug utility. An in-line assembler allows you to optimize execution speed using 68000 opcode subroutines.

Multi-Forth is provided on two diskettes, with an over 300-page manual. The main disk (bootable) contains AmigaDOS system libraries, utilities, the Multi-Forth kernel and system and 26 FORTH source code files with functional extensions and demonstrations. Multi-Forth utility extension files include a FORTH source file printer, a fast two-drive backup utility, an in-line 68000 code assembler, a memory dumper, token editor, sprite toolkit, timer and word list generator. The main executable Multi-Forth development system runs with a complete set of preloaded Intuition structures and graphics calls.

Especially useful in development is the ability to call the CLI and other operating system utilities. You can directly call DIR and ED from within Multi-Forth, making it possible to write Multi-Forth programs with ED, while maintaining the Multi-Forth window for execution, interpretive extension and debugging. Likewise, you can list disk directories ►

without exiting the programming environment. The CSI Auxiliary files disk includes documentation on ROM kernel routine structures, library files for system executive symbols and calls, basic graphics structures, CSI rotating/scaling graphics, block-handling utilities, a floating-point math extension, sieve benchmark references and a "quick vocabulary" utility.

Multi-Forth enhancements offer a number of advantages over more conventional FORTH implementations. You can define local variables, allowing operations to be performed on named items within functions, with stack use simplified for parameter passing between functions. Data structure (or structure) notation is supported, allowing the definition of complex arrays with named components. Structures facilitate setting up the complicated data formats used for various Amiga system calls.

CSI has furnished a novel solution to FORTH community debates over whether source code is best developed in blockless text file format or in conventional FORTH block/screen (1K, 16 lines × 64 characters) format. In the default configuration, Multi-Forth uses standard ASCII text files, conveniently produced with Amiga's ED or other ASCII editors. If you desire, block-file support extension files can be INCLUDEd for a system set to deal with standard FORTH screens. Block file support includes dual I/O buffers, a fairly typical FORTH line editor and a text-stream to block file translation utility. With these functions, you can easily upload block-oriented code from other systems for editing, conversion and customization.

By virtue of its 32-bit addressing scheme, Multi-Forth also allows you to exceed the 64K program size limit imposed by many FORTH systems. Since FORTH evolved in a 16-bit environment, limiting direct addressability to 64K, many programmers have followed inventor Charles Moore's lead in preserving code efficiency and inherent compactness. However, as some Artificial Intelligence programmers have aptly demonstrated, even good FORTH application code can occupy a lot of RAM space. Multi-Forth initially assigns its system limits to 64K, but you can resize them to use all available address space.

A turnkey utility produces auto-executing run-time images of Multi-Forth programs. In the FORTH tradition, turnkeyed programs are compact and fast. In an extension of its previous licensing policy with other products, CSI allows free distribution of turnkeyed programs (but not snapshot development systems) as long as a run-time Multi-Forth language copyright notice is preserved. Considering the price of a developer's license (less than $90), system features and the availability of CSI phone and CompuServe-based user network support, the distribution policy is quite generous.

Comparison Shopping

As a user of CSI's MacForth, I was interested in how Multi-Forth compared with its older Macintosh brother. CSI used a common 68000 Multi-Forth kernel in developing implementations for the Macintosh and Amiga. MacForth isn't a better implementation than Multi-Forth, only different. In programming, MacForth uses pull-down menus for calling system functions, whereas Multi-Forth inputs control words to the CLI. While MacForth uses Macintosh QuickDraw monochrome graphics functions, Multi-Forth provides simplified high-level color graphics system calls and a complex set of words for direct calls to the Amiga ROM Graphics library.

A few disappointments may be found (or not found, as the case may be) in the Multi-Forth User's Guide, which gives a useful introduction to the basics of FORTH programming and describes major Multi-Forth Amiga-specific functions. However, in some instances, there are few good examples of critical system functions, and no mention of related component words in an otherwise excellent glossary of kernel and extension system words.

While I hesitate to recommend Multi-Forth to rank novice programmers seeking an easy exit from BASIC, CSI's system for the Amiga is a very powerful tool for a serious developer willing to work with FORTH. Perhaps the best part of the deal is user support, in the form of a newsletter, telephone hot line and access to CSI's FORTH network on CompuServe.

Multi-Forth
Creative Solutions Inc.
4701 Randolph Road, Suite 12
Rockville, MD 20852
301/984-0262
$89
No special requirements.

Reason

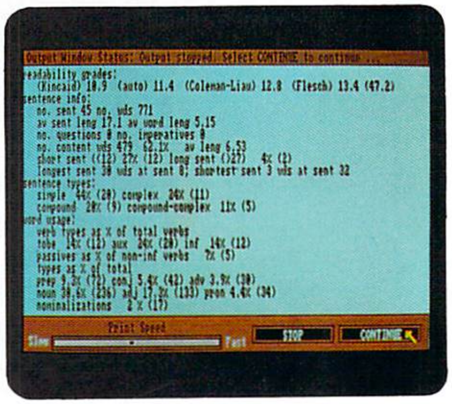
Computers replace editors?

The Other Guys hope so.

By Matthew Stern

"REDUCE THE percentage of compound sentences and watch out for abstract terms. You have maintained a good balance of passive and active sentences and write at a tenth-grade reading level." These comments did not come from my editor, but from my Amiga, specifically from Reason, a text analysis program by The Other Guys.

Based on AT&T's Writer's Workbench program, Reason compares ratios of sentence constructions and word lengths to Bell Laboratories' standards or parameters you develop. From these statistics, Reason determines how the document compares to several indices of readability—the Kincaid, the Coleman-Liau and the Flesch. Reason also offers specific suggestions for editing diction, style and organization.



Reason's analysis of this review.

Reason reads an ASCII file, then performs five major tests—Check Document for Prose, Critique Document for Style, Word Analysis, General Structure and Proofread Document. Check Document for Prose appraises your text, calculating the grade level required to read it, the percentage of active and passive sentences and the variation of simple and complex sentences. Critique Document ►

for Style gives a detailed report on the results of the previous test. It can display words or sentences of specified lengths and reading levels, passive sentences and noun nominalizations. Word Analysis tests for diction problems (abstract words, acronyms, sexist words, split infinitives) and, in some cases, suggests alternative terms. To examine your document's organization, select General Structure. You can list frequently used words, the first and last sentences of every paragraph and the number of syllables in each word. The Sentence Breakdown option identifies the parts of speech that make up each sentence. The last test, Proofread Document, checks for incorrect spelling, diction, punctuation, double words and split infinitives. Reason does not alter the original file, so you must use a word processor to make any of the suggested changes.

From these tests, the program generates statistics and reports that can be printed or saved to disk. The results are easy to read, if you understand grammatical terms. The well written 130-page manual fully explains each test and contains an index, glossary and word use guide. Since you still need a knowledge of good writing style to interpret Reason's analysis, the bibliography suggests some supplemental reading.

Most writing departments have their own style guides, so Reason lets you generate custom standards and dictionaries from the statistics of at least 20 documents. Use the None. . .Just Print Statistics option from the Critique Document for Style test to generate the statistics, and save the results in a text file. The Build Custom Prose Standard option in the Extras menu reads each of the statistics files, calculates an average and saves the information in a new standards file. For proofreading, you can enter custom dictionaries and suggestion files of suitable replacement words.

The commands are logically arranged and labelled, so I was able to understand most operations without looking at the manual. The point-and-click control is convenient; however, I would like an option that automatically runs all the tests you select. Currently, you have to click a gadget each time you run a test.

Vital Statistics

Reason is fast, but large. The program seems to perform most of its operations in RAM, and it can run several options at once. Documents under 2,000 words took only a few seconds to analyze. Reason consumes most of a 512K machine's memory and can only be entered or abandoned by rebooting. You cannot multitask. While it disables Workbench, you can set Preferences from within Reason. According to The Other Guys, an updated version will support multitasking, Workbench and the CLI.

Professionals with a heavy volume of material to proofread and textbook writers who must aim their prose at a specific grade level will most appreciate Reason. The program excels at catching nagging grammatical errors. Be warned, Reason will not spot all your errors (or correct any automatically). Even the documentation only claims a 95% success rate. Unlike a human proofreader, Reason does not check for context, so some words flagged as in error may actually be correct. Nor will it analyze imperative sentences (such as "Reboot the disk.") correctly unless you type a tilde at the end.

With its hefty $395 price tag, Reason is designed for people who know the rules of writing well. For the fledgling author, a $3.95 copy of Strunk and White's *The Elements of Style* (The MacMillan Publishing Co.) would be vastly more helpful and informative. While Reason can check the mechanics of a document's structure, organization and diction, it cannot check its content, style and quality. That is still a job for human readers.

Reason
The Other Guys
PO Box H
Logan, UT 84321
800/942-9402 (in UT 801/753-7620)
$395
512K required.

Butcher

Hide your mice—here comes the carving knife!

By Sheldon Leemon

DESPITE ITS provocative name and meat cleaver logo, Butcher 2.0 is neither a sick fantasy role-playing game nor an interactive meat-cutting tutorial. It is, instead, the latest version of a very useful graphics tool. Though the program includes some painting facilities, it is not designed for creating pictures from scratch. Its real strength lies in its ability to manipulate pictures created with a paint package or digitizer.

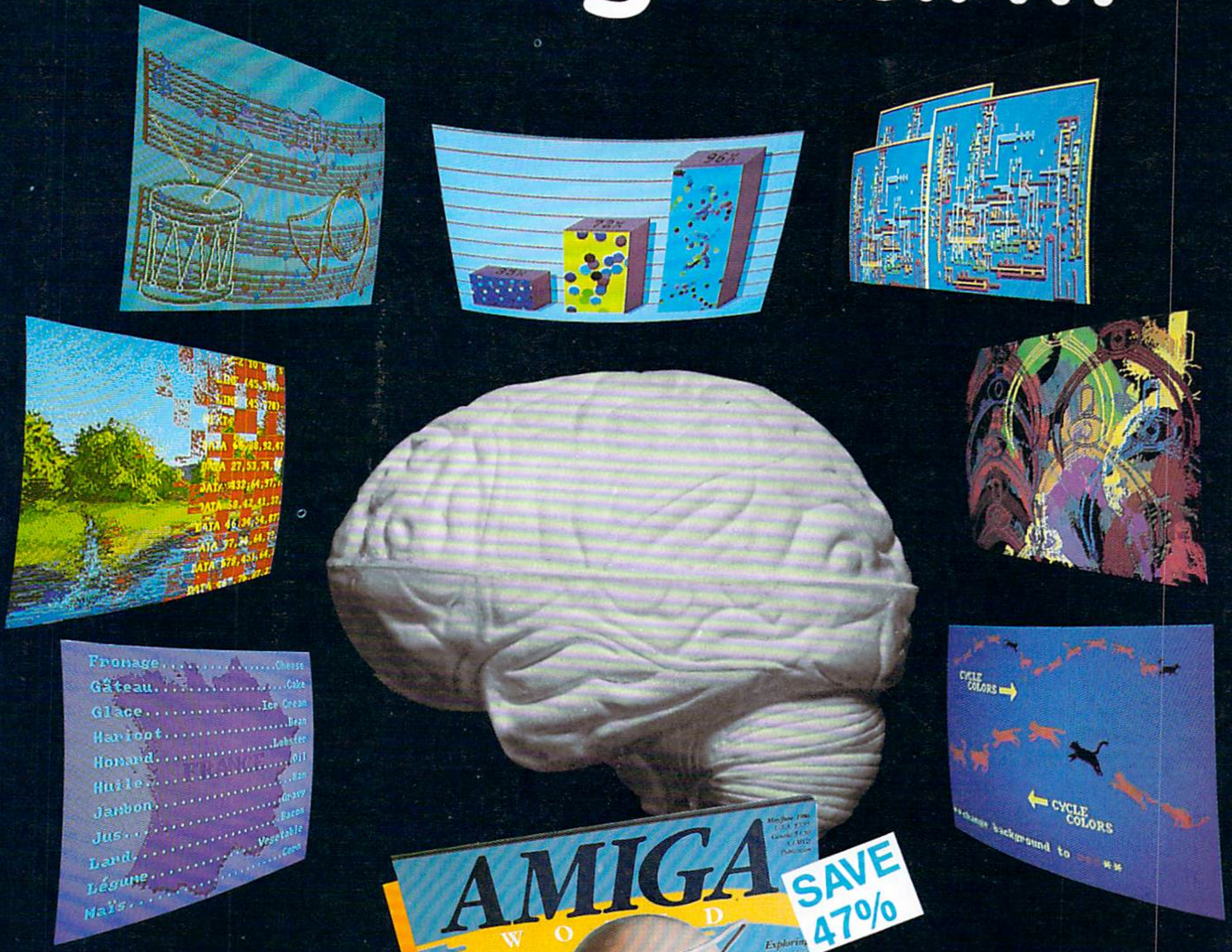
Once loaded, a picture will be displayed in whichever resolution it was saved. However, you may change either the horizontal or vertical resolution without affecting the picture's on-screen appearance. You can change the size of the picture bitmap, regardless of the display resolution, in order to work on pictures too large to be accommodated entirely on the screen. Butcher also lets you change the number of bitplanes, and thus control how many colors can be displayed at the same time as well as how much memory a picture take uses. The program provides an option to convert pictures back and forth between the 4,096-color Hold-and-Modify (HAM) mode and 32-color low-resolution mode, but otherwise does not manipulate HAM images.

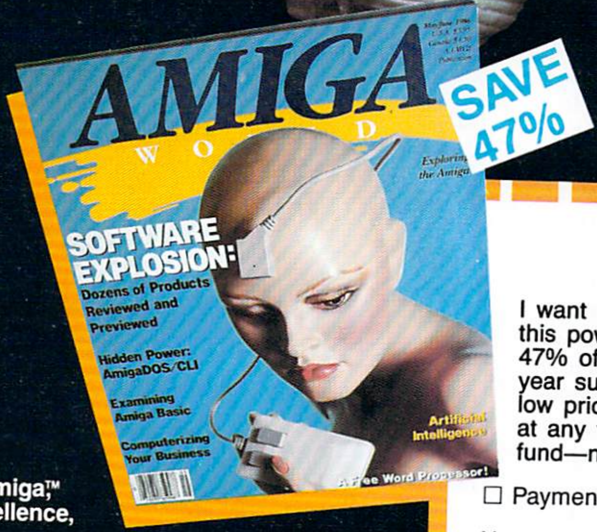
Many of the program's features affect only color. For that reason, it holds three complete palettes in memory at once and allows you to toggle between them. You can also copy whole palettes or remap colors from one to another. Butcher enables you to change any color or palette to its negative (opposite) values, exchange two colors or sort the palette by intensity of colors. It's easy to make your picture look like an antique photograph by tinting it with sepia tones (a range of faded browns), or you can tint it with any other color. The program allows you to introduce false colors by rotating the red, blue and green values of each color, or pseudo-colors which assign red, blue and green values to colors of varying intensity. There's a function to convert any picture to shades of gray, based either on color intensity or on the levels of red, blue or green components in each register.

Chop! Chop!

In addition to the palette-setting options, there are a number of image-processing functions that alter the actual composition of the pixels. Using Edge Mapping, a sophisticated function that allows you to produce a dark outline of the major features of a picture, you can make a digitized image resemble a charcoal ►

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sketch. This option is very helpful in reducing the complexity of an image, breaking it down to its barest outline. The Filter feature changes isolated pixels or groups of pixels to match the colors of neighboring ones. Mosaic performs a function known as "pixelization," redrawing the picture using large block patterns instead of individual pixels. You can even edit the shape of these block patterns on a 32 × 32 grid. The program also includes functions for converting colored pictures to black-and-white; dot patterns of varying density replace the colors by means of dithering patterns.

This latest version of Butcher (2.0) allows you to define a rectangular area (a "clip") in which to confine image manipulation. This is helpful for operations that will work with only one section of the image. You may also save or print the clip separately. Most of the functions let you select a color by clicking on any part of the screen displaying that hue. The program was clearly designed with multitasking in mind, since it provides several options that allow you to manage the amount of memory used. You can load each part of the program separately, close the Workbench screen or delete the bitmap used for the UNDO buffer, and monitor available memory. Overscan eliminates screen border.

Butcher is particularly good for cleaning up digitized images. If you digitize four-color artwork, for example, you'll find that due to lighting variations, there may be six shades of red, eight shades of blue and many shades of gray in a single picture. Butcher allows you to sort colors by the frequency of their appearance, then merge or blend similar tones to yield exactly four colors. By consolidating pixels that are identical in color but were drawn from different palettes, it enables you to reduce the number of color registers used in the image. This operation is a prerequisite for transferring images into a program like DeluxeVideo (Electronic Arts) which restricts you to eight colors.

Butcher is a powerful aid for work that requires conversion between graphics or resolution modes. It delivers what it promises, and I did not find any bugs. By effectively accomplishing a number of graphics tasks, Butcher proves again that famous old proverb: "the meat cleaver is mightier than the mouse."

Butcher 2.0
Eagle Tree Software
PO Box 164
Hopewell, VA 23860
804/452-0623
$37
512K required.

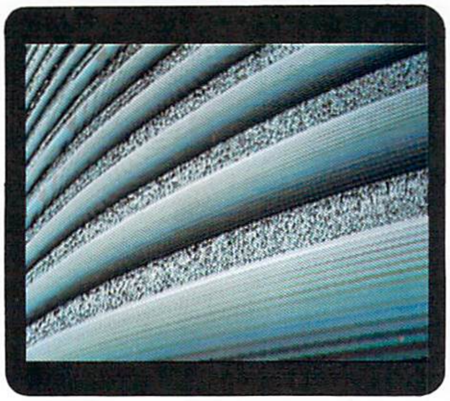
Doug's Math Aquarium

"On the monitor—a shark!"

"Relax, it's just cos[π(3x ÷ zy)]"

By Louis R. Wallace

WHAT THE HECK IS a math aquarium? Generally, the word "aquarium" calls to mind those civic establishments that exhibit aquatic lifeforms. Only after a thorough tour of this program did I appreciate the relevance of the name. Doug's Math Aquarium transforms your computer into an interactive exposition center for exotic mathematical equations, where you can closely examine plots of functions—even "walk around" and view them from different vantage points just like in a conventional aquarium.



Complex math never looked this good.

Doug's Math Aquarium is nicely mapped out so that even a first-time visitor can quickly and easily find his way to the exhibits. Just inside the entrance is the Numerical Swamp (otherwise known as the formula input area) where you plug in an equation and choose either the Contour or Wire Frame display mode. Then, as you peer through the glass of your monitor, your equation's pictoric manifestation slowly emerges. Images range from stunningly beautiful and complex to mere visual "noise," depending upon the expression entered.

Below The Surface

The Numerical Swamp will accept any formula defined in terms of X and Y. Doug's plots equations as you did in high school algebra. Instead of points connecting the familiar solitary line on the chalkboard graph though, X and Y become positions on the screen's invisible axes; color and gradation are added to yield a far more interesting portrayal. What's more, Doug's can easily graph complex two- and three-dimensional equations that would run you out of chalk, time and patience. You can create equations of up to four functions, using any combination of the many supplied (including Boolean and trigonometric functions) and your own. By plugging in "If/Then" statements, you can invoke recursion (the disk supplies an example of a recursive function in it's description of a Mandelbrot).

You may want to manipulate your equation's graphic outcome with some of the many options. You can, for example, set the minimum and maximum values for X, Y and Z. Scaling forces color into a range of values in Contour, while in the Wire Frame mode it adjusts the image to fit entirely on the screen. Some 3-D wire functions are: Perspective, for viewing plots, Hidden Line, which makes a wire model appear solid, and Viewpoint, which allows you to determine a viewpoint.

Once your equation appears on screen, you can use Zoomin and Zoomout from the Action menu to examine areas of particular interest. You can perform other operations too, such as finding the X and Y values of any location (part of the equation) by selecting Analyze, then pointing to the area and clicking the mouse. Doug's Math Aquarium supports the four standard Amiga screens (320 × 200, 320 × 400, 640 × 200 and 640 × 400) but does not support printers or HAM and HALFBRITE modes. You can, however, save a screen in IFF format so that it may be used with virtually any Amiga graphics program. Alternately, you can conserve space by saving just the equation.

Most of the menu options are self-explanatory, and the manual will clarify anything not readily understood. The authors have stated that their objective was ►

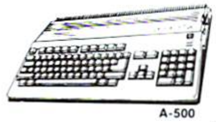
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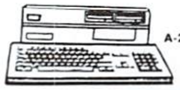
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to utilize math for fun and artistic expression; consequently the manual guides you in using the program, leaving out the mathematics lessons.

I suppose the Aquarium would be useful for students in mathematically intensive courses, and teachers might find it an attractive method of demonstrating esoteric scientific principals. More often than not though, I suspect it will find it's way into the hands of individuals who would enjoy spending a quiet hour or two zooming into a Mandelbrot, examining the graphic effects of a change from cosine to arctangent on a 3-D function, or exploring some obscure mathematical territory that, very possibly, no other human has ever before seen. The program might also appeal to the artist searching for another way of looking at the world, or just a small part of it. Once submersed in Doug's Math Aquarium, you too may find it entertaining, engrossing and even a little addicting, just as I did.

Doug's Math Aquarium
Seven Seas Software
PO Box 411
Port Townsend, WA 98368
206/385-3771
$89.95
512K required.

HAICALC

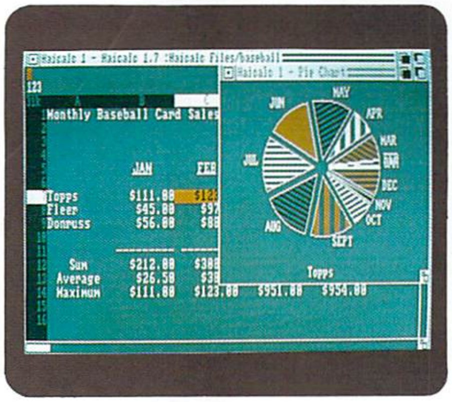
In the ranks of spreadsheets, it's a great place to start.

By Sandra Cook Jerome

IN THE CURRENT Amiga spreadsheet battle, Haitex Resources has taken aim to capture beginner and budget-minded users with Haicalc. While those familiar with other spreadsheets might point out major features that this program lacks, Haicalc offers speed and simplicity at a price considerably lower than its competitors.

Once loaded, the colorful spreadsheet appears with the cursor ready to go in cell A1. You can enter numbers and labels, or access a pull-down menu with the mouse. The menu makes available many standard commands for changing column width or formatting numeric displays. You can also activate frequently-used commands such as Copy, Save or Print by typing a slash and the first letter of the command. Haicalc supports most Amiga features such as multitasking and multi-windowing.

Even experienced spreadsheet users might consider this program for simple tasks; the input and display speeds surpass those I have seen in any other spreadsheet. Haicalc uses adjustable gadgets for quick scrolling across and down. You can increase the scale of the gadget to allow instant display of a frequently-referenced column when working with a very large spreadsheet, or size it down for a small one. You can also adjust the return key to move the cursor in any of four directions. If you are entering numbers in just one column, for example, you can save steps by programming the return key to move the cursor down instead of across. Two other time



Haicalc and one of its five graphs.

savers are function keys that enter common commands and simple keystrokes for menu shortcuts. Additionally, for those of us who never understood why it was necessary, the end parenthesis can be omitted when entering ranges.

THE SACRIFICE

Haicalc does not intend to compete with the more powerful spreadsheets on the market, and it is apparent that some sacrifices were made to keep the price low and the speed high. Because there are no database functions included, even a simple sort is impossible. There are only six functions—@AVG, @MAX, @MIN, @SUM, @COUNT and @CELLS—compared with 63 in MaxiPlan Plus (Oxxi Inc.). The program can generate bar and pie graphs, but screen dump capability, which is required to print a graph, is not included. To update totals you must press a function key, as the spreadsheet does not automatically recalculate. The Copy command places the value or formula into a buffer instead of transferring it directly, so a two-step process of Copy to buffer and Paste to range is in order. Files created with Haicalc are not compatible with other spreadsheets, and the program can import only ASCII files. While you may display any system font on screen, only variations such as bold, italics and underlined are available for printing.

Haicalc is not powerful enough for tough financial projects, but it is an ideal starter spreadsheet—functional, easy to learn and a good value.

Haicalc
Haitex Resources
208 Carrollton Park Suite 1207
Carrollton, TX 75006
214/241-8030
$59.95
512K required.

VISUAL AURALS

"The colors, man. I mean, the colors! Like, wow!"

IN THE LATE '60s it would have been called a color organ. Color organs were boxes with Christmas lights strung inside, that you set by your stereo. They would pulse and change colors, more or less, to the beat of the music. They were very hip. Very far out. Very groovey. They also didn't work very well. Nearly 20 years later technology has advanced far beyond the Christmas tree lights stage. We have chips and printed circuit boards. We have super sophisticated personal computers like the Amiga. And now we have Visual Aurals.

Visual Aurals with the Mindlight 7 (a circular box that plugs into the second mouse port) is the most sophisticated, most complex, most technologically advanced color organ ever devised by humans. Plug in the Mindlight 7, boot up the software, turn on some music and watch the screen do some colorful things in time to the music. That's about it.

GETTING IN DEEP

The Mindlight 7 measures and processes sounds, either from its built in micro- ►

Circle 143 on Reader Service card.

Software Guide Corrections

The following companies and products were listed incorrectly in the December '87 Software Buyer's Guide:

Brown-Waugh Associates should be Brown-Wagh Associates. Contact them at 16795 Lark Ave., Suite 210, Los Gatos, CA 95030, 408/395-3838.

Dr. Tease is actually Dr. T's, located at 220 Boylston St. Suite 306, Chestnut Hill, MA 02167, 617-244-6954.

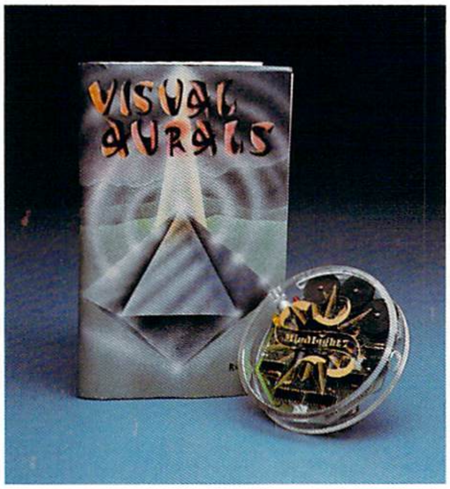
Fantasie I and III should be spelled Phantasie, and are available from Strategic Simulations, 1046 N. Rendstorff Ave., Mountain View, CA 94043, 415/964-1353.

Micro-Systems Software can be reached at 12798 Forest Hill Blvd. Suite 202, West Palm Beach, FL 33414, 305/790-0770.

NewTek's name is one word, not two. Direct your product inquiries to 115 West Crane St., Topeka, KS 66603.

Ultraball was Arkanoid's working title. The game is available from Discovery Software Int., 163 Conduit St., Annapolis, MD 21401, 301/268-9877.

phone or stereo phono input or from both. It measures Overall Intensity, Overall Frequency, Bass Intensity, Bass Frequency and Treble Intensity. It transduces audio signals from 20Hz to 16kHz and the gain can be adjusted from 0 to 10,000 all with a frequency response from 20Hz to 20kHz. The Mindlight 7 is also a complete MIDI recorder and sequencer with mouse controlled pitch, modulation, tempo and transpose functions. It supplies a fully adjustable sync out signal for drum machines, etc. (The manual suggests MIDI-Gold from Golden Hawk Technologies.) There is only enough storage space for 2,500 notes (assuming two MIDI events per



Feelin' groovy . . .

note, On event, Off event). On top of the Mindlight 7 are the three thumbwheels that adjust microphone gain, overall gain and visual bias levels (the level at which a sound will trigger a visual response). The unit couples audio signals into four groups (Bass Intensity and Treble Intensity, Overall Intensity and Frequency, Bass Intensity and Frequency, and Overall and Treble Intensity) which are then fed into the system.

Once in the system the sounds trigger changes in the visual display. Colors, shapes, speed, patterns, waves, dots, sprites, brushes, IFF picture files, genlocked images and on and on, all are influenced, changed, altered by the sounds.

You can select six different arrangements of visuals, pictures and video. There are 84 shapes, waves, lines and patterns available. You can choose from five major (and a multitude of minor) methods of fading from one image to the next, and a minimum of 16 modifiers for the visuals and faders. Pile on top of this three seperate color palettes (with 10 more available in special cases) with six color modes influenced by five sound parameters and variation numbers ranging from −100,000,000 to +100,000,000 that can alter any of these changes taking place on the screen (which can be lo-res, med-res, hi-res, interlaced, HAM, four, eight, 16 or 32 colors, with IFF files, IFF brushes, sprites, "visual environments") which can be loaded from any drive or drives (hard, floppy, RAM or user-specified directory) either automatically or alphabetically (forward or backward, of course) using keyboard or mouse; but, like, each thing can be changed using the function keys, numeric keyboard, mouse, number keys and regular keyboard keys or you could let the music itself change stuff based on sound peaks, sound level, smoothed audio, "bow," horizontal and vertical (color changes depending on the location of the current drawing object on the screen) or using one IFF screen as a mask so that the patterns and colors don't intrude on the space of something else or just cycle the colors and changes and fades and drop screen and spare drop screen and on and on and on . . .

Whew!

Confused? Don't worry. You're offered two types of help (each with variations) that do amazing things all by themselves (the "help crystal" mode tells you "the rate or selection within the currently selected modifier" by it's position relative to the cursor. If the crystal appears above the cursor, the up arrow was the last key pressed to alter the modifier. If the crystal appears to the left, the left arrow was the last pressed. See?)

A simple (if I can even use the word "simple" when talking about Visual Aurals) list of all the functions and features of Visual Aurals would be longer than this review section, but if there were two that should be mentioned they would have to be Mozais and X-Kolai. Doing a severe disservice to either of these features (as the manual states "This effect is not explained by mere words"), Mozais is a mosaic-like method of creating visuals, changing visuals and fading from one visual to another, and X-Kolai is a mutated polygon deforming method of doing pretty much the same thing . . . only not. Does that clear things up? Oh, there are ►

lots of other ways to alter the visuals, like scrolling, bit-splitting, using the mouse to grab a brush, just hitting keys, timing, presets, or if your brain just over-amps, the Evolve mode changes everything.

What It Is

I have a hard time evaluating Visual Aurals on any level this side of the astral plain. The program is incredibly complex, but it just puts colors and patterns on the screen. It is sophisticated, convoluted, overflowing with options that let you do incredible things to the colors and patterns on the screen. The programming wizardry and technical knowledge is apparent (it took some sort of genius to come up with Visual Aurals, I just can't pin down exactly what sort), but it just puts colors and patterns on the screen. The manual slips in and out of coherency. (When the screen goes blank they call it a Visual Void Space, and you can "try the '?' to attempt to hyperspace out of a visual void space.") It has features that no other software developer ever thought about, and *if* any other developer ever thought of an option, Visual Aurals has it, but it still just puts colors and patterns on the screen. The program offers more options than DeluxePaint, Aegis Animator and WordPerfect combined *all to just put colors and patterns on the screen!*

Perhaps Visual Aurals is a phenominally complicated sight-sound-video-music-manual-options-and-menu puzzle or a brilliant time warp into the past and future. Perhaps it is an honest and sincere concept/product gone berzerk. Perhaps this is exactly the kind of thing that computers were invented for, and thousands of people will rush out to buy it (not to mention its promised successor, Visual Aurals III-D). I can't say.

Visual Aurals alters moving colors and shapes on the Amiga screen based on the input of sounds. There are billions of ways this process may be modified. The program is very complex and varied. The manual is erratic. There are more options than anyone could possibly learn or use without months of exploration and experimentation (this is one of the fun things about Visual Aurals). It is neat, it is pretty spacey, and unless you are a member of an acid-rock band playing in the last psychedelic dungeon of the world, this product has no practical use whatsoever. Maybe it's not supposed to. You have to decide if it's worth the price.

—G. Wright

Visual Aurals
Visual Aural Animation
PO Box 4898
Arcata, CA 95521
707/822-4800
$169
512K required.

Game Shorties

Arazok's Tomb

IN ARAZOK'S TOMB, you are "a fearless and greedy reporter for a sensationalistic newspaper." Arazok was a kind of evil Druidic priest who went into the Netherworld and never came back. But an archaeologist has disappeared near Arazok's old Scottish stomping grounds, so you've taken off after him to help.

The graphics and interface are up to Aegis' usual high standards. As you come to new places, and new situations, a picture comes onto the screen to show you what you're seeing. Clear and colorful, they lend an appropriate aura to the adventure. The interface allows you to direct your character by typing commands into the text-entry window, but you can control some actions from the graphics screen itself. A compass rose lets you click a direction for quick course changes, and the pull-down menus help you handle your inventory, save games and select various options. Useful, attractive and quite friendly, this interface is definitely worth a look.

I'm not sure, though, that the rest of the game is. The parser is terribly primitive, and playing it is an exercise in frustration. There seems only one solution to many of the puzzles, and none of them are particularly inspiring. For example, the game has a Push command, but will not allow Pull. You can Put an object inside another, but if doing so is not the solution to the puzzle, the object will simply drop to the ground. Since the graphics screen shows each object on the ground, dropping or taking an object means a picture update, which in turn means more disk access. To avoid the frustration, you become unwilling to try all possible actions.

One other thing. You have a magic candle, and a book tells you how to light it. Fine, except that it runs out after a while. Fine, too, except that you can't move once it's out. Instead of letting you grope for the candle, Arazok's Tomb says you've stumbled and died. That means starting over, which means more waiting for the disk. The game seems to treat the player as an idiot.

If the quality of the game were close to that of the graphics, Arazok's Tomb would be something to behold. As it is, its value is highly suspect. *($39.95, Aegis Development, 2210 Wilshire Blvd., Santa Monica, CA 90403, 213/392-9972. No special requirements.)*

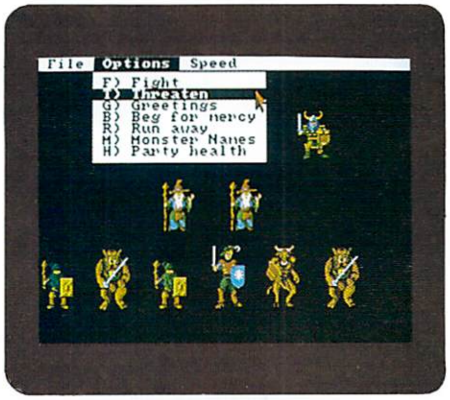
—N. Randall

Phantasie III

THE DARK LORD Nikademus has set his evil sights on conquering not just a single island, but the entire world this time. Your job is to assemble a band of six stalwart beings (from humans, dwarves, elves, gnomes, halflings or 10 other types of creatures) from six classes (fighters, priests, monks, rangers, thieves or wizards) each possessing higher or lower values for five main attributes (strength, intelligence, dexterity, constitution and charisma) and varying degrees of skill in areas like fighting, lock picking, listening, spotting traps and so on. Once you have a band together, you set out from town to explore, fight, gather treasure, clues and experience which you can trade for training, weapons, armor, magic spells and such. In this way your band becomes stronger and more skilled in the not-so-subtle art of survival in a world inhabited by over 80 types of monsters, and where most learning is by trial and error (errors usually being fatal).

There is an awful lot going on in this sequel to the popular games Phantasie I and II. Each character has two or three screens of information which detail what

they are carrying, how many points they have in the different areas, what spells they know, and even which parts of their bodies are okay, hurt, broken or missing. Like most games of this type it is hard to get started (just about every monster out there can beat a novice group), so it is a good idea to stick close to town and save the game as often as you can. The documentation, mostly lists of weapons, creatures, spells, potions, options and commands, requires a very careful read, and a few items are left out.



Good (bottom) vs. Evil in Phantasie III.

Phantasie III is more of an epic quest than a simple hack-and-slash adventure. The graphics are good for this genre, but not breathtaking. There is simple animation of the characters during battles but this is by no means an arcade-style game (each character's moves can be carefully thought out even in the heat of fighting).

Phantasie III is a good conversion of a classic role-playing adventure game. It will probably be frustrating at first as your characters get killed over and over, but once they advance a few levels it will be difficult to turn the computer off. It is a good mix of sci-fi fantasy and strategy. It doesn't take as much concentration as a war game simulation or a text adventure, but it is more stimulating than a simple shoot-'em-up game. You get attached to the characters as they advance through the levels, and even if you never solve the game it is very enjoyable. Dust off your book of spells, oil the armor, keep your shield high and may the gods favor you. *($39.95, Strategic Simulations, 1046 N. Pendstorff Ave., Mountain View, CA 94043, 415/964-1353. 512K required.)*

—G. Wright

THE BLACK CAULDRON

LIKE THE MOVIE of the same name, The Black Cauldron is geared toward youth. Strangely, this focus makes it perhaps the strongest of Sierra's releases. Using joystick, mouse or keyboard, you guide Taran through the 3-D world, with your mission firmly in mind. The interface is smooth, and even the Use Object function is easy to use.

Particularly impressive is the "Do" command. While most adventures force you to decide exactly what to do in each location, Black Cauldron allows you to command your character simply by hitting the F6 key; the game then tells you whether or not there is anything worth doing. At one point for instance, you see a tree with a hole in the trunk. Instead of typing "Go to the tree and look inside," you walk Taran to the tree and press F6. The screen tells you that you see a lute. Press F6 again and you have taken the lute. The process may sound simplistic, but it is extremely friendly.

I found only one annoying flaw. As animation for the Sierra series was originally designed, the character moves in only four directions on the screen. He can go left, right, away from you, or towards you, but he cannot move diagonally. In play, this means that walking on anything drawn on an angle requires a series of left-right movements, in addition to the towards-or-away direction. Climbing stairs for example, demands shuffling Taran's body until he looks to be dancing. Not only is this silly to watch, it also affects play. In one especially trying sequence, Taran must climb a rope up to a cliff. Climbing is a series of lefts, rights, ups and overs, and because of the way the rope is drawn, the pattern is inconsistent. The result is that Taran frequently falls.

I have nothing against making rope climbing challenging, but this particular method is far from satisfactory. On an Amiga, where diagonal movement should be easy to implement, this represents a distinct flaw. It's hardly major though, and still the quest is enjoyable and quite addictive. The graphics are good, and the gameplay is even better. *($49.95, Sierra On Line, distributed by Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404, 415/571-7171. 512K required.)*

—N. Randall ■

WHAT'S NEW?

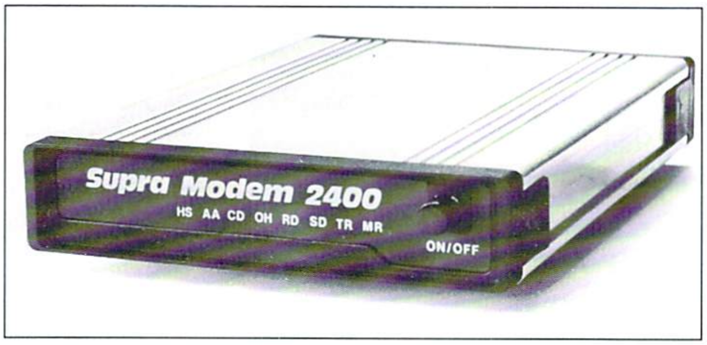
We've got toasters, aliens, languages, alien languages, memory (oh, have we got memory) and lots more in the closet.

Compiled by Linda Barrett and Barbara Gefvert

SUPRASTARS

Now making its debut is the compact **SupraModem 2400**. The SupraModem plays a supporting role for asynchronous operation at 300, 1,200 and 2,400 bits per second. You can configure the unit, then store configurations so that they'll automatically load. It is compatible with AT commands as well as Bell 103/212A, CCITT V.22 and CCITT V.22bis protocols. It features automatic answer and dial and two modular jacks. For $179.95, power adapter and telephone cable are included; software packages (including Amiga cables) are available, as well.

Also entering the spotlight is the **SupraDrive FD-10 Removable Floppy Drive**. This system offers floppy flexibility with a 10MB capacity, and promises near hard-drive speed with average access time of 80 milliseconds. You can press it into service as primary storage or as a data backup device. The FD-10 allows the exchange of information between computers; each removable 5¼-inch diskette stores up to 10MB of data. The unit connects to a SCSI interface and commands $1,095 per performance, including software and cables.



The compact modem from Supra Corporation.

For fan club information contact Supra Corporation, 1133 Commercial Way, Albany, OR 97321, 503/967-9075.

LIVE! THRIVES

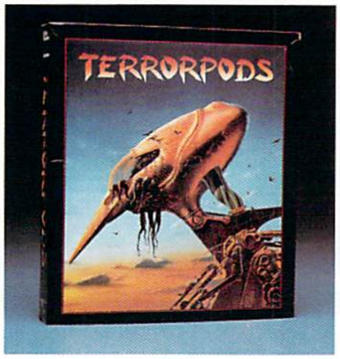
As reported in the November '87 issue, **LIVE!**, the real-time video framegrabber for the 1000, is shipping. The unit plugs into the expansion port, and offers two RCA-style jacks. The first accepts NTSC video signals from your video source, while the second sends the signal out for viewing, video equipment or a genlock. According to A-Squared, the digitize and display rate of moving images is 15 frames per second. You even have a choice of display modes—a 16-level gray or a 32-color moving image. You can apply color maps to the image, then change them with the mouse. Images are saved in IFF format, so they are compatible with most paint programs. For a more extensive description, contact A-Squared Distributions Inc., 6114 La Salle Ave. Suite 326, Oakland, CA 94611, 415/339-0339.

TWO SLICES OF VIDEO

Videos and digital effects will be popping out all over, thanks to **Video Toaster** from NewTek. A comprehensive video system, Video Toaster integrates a genlock, frame capture and digital video effects. Genlock output is broadcast quality RS-170A standard, while the frame capture nabs a full-color, NTSC-standard frame in 1/60th of a second. Supporting all resolution modes, the frame buffer lets compatible software run in millions of colors. You can manipulate videos in real time and evoke broadcast-quality effects. Some of the pre-programmed effects are page flips and turns, spheres, montages, pushes, splits, transpositions, blinds and moving blinds, pixelizations, fish-eye, stop motion, mosaic and hourglass. Promised expansions to the Toaster include real-time image processing support, a TMS 34010 video co-processor, a professional-quality chroma-key and NTSC paint program plus a programmable video switcher. A bit more expensive than traditional toasters, the Video Toaster retails for $799.95. Order your electronic breakfast from NewTek Inc., 115 West Crane St., Topeka, KS 66603, 913/354-9332. ►

MINERS AND MEDDLERS

All is not well on the mining asteriod of Colian, the **Terrorpods** have landed. A combination of arcade shooting and bartering strategy, Terrorpods from Psygnosis casts you as an



A Terrorpod on the loose.

undercover Federation Agent assigned to discover the manufacturing secrets of the evil Empire's ultimate fighter, the Terrorpod (similar to, but more advanced than the *Star Wars* Walkers), and find the materials to build your own. In your Defense Strategy Vehicle, you can ramble about the asteriod, send a drover to trade with each of the 10 colonies for the resources you need and, of course, fight off the Terrorpods when they discover your true purpose. To satisfy both their American and European clients, the manufacturers have included a Nationality Selection screen, which lets you choose the language the game's text will be displayed in. For transport to Colian, contact Psygnosis Ltd.'s U.S. distributor, Computer Software Services, 2150 Executive Dr., Addison, IL 60101, 800/422-4912.

HOLD STEADY

MicroWay has eliminated the Amiga 2000 j-j-j-jitters with **FlickerFixer**, a video graphics enhancer. Designed to connect with multi-scanning monitors such as the NEC, MultiSynch and Sony Multiscan, FlickerFixer stills flicker and eradicates visible scan lines. The board fits into the A2000's video slot and can handle resolutions up to 704 × 470 with overscan. For $595, FlickerFixer is available from MicroWay, PO Box 79, Kingston, MA 02364, 617/746-7341.

EASYL-Y DONE

Previously offered only for the A1000, the pressure-sensitive **Easyl** graphics tablet is now available for the 500 and 2000. The 500 version is $399, while the 2000 model sells at $499. Draw up your order and send it to Anakin Research Inc., 100 Westmore Drive, Rexdale, Ontario, Canada M9V 5C3, 416/744-4246.

FRACTAL BEAUTY

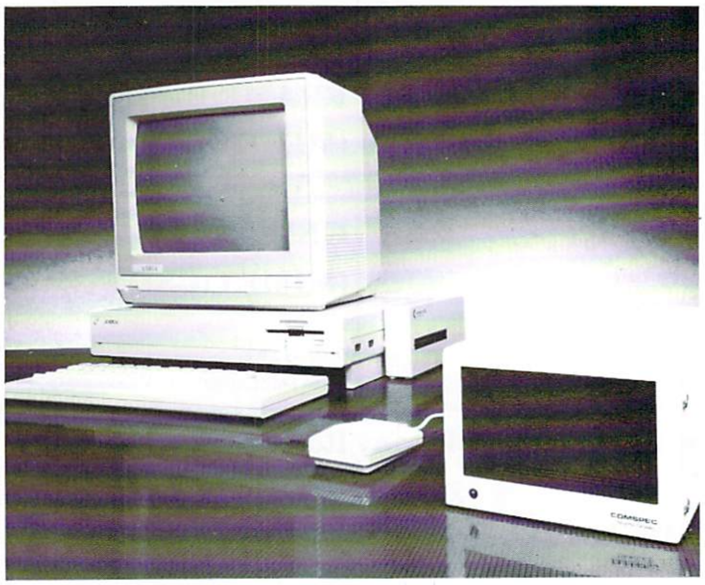
The distinct disciplines of science and art are combined in **Analytic Art**, a program that allows you to generate complex graphics through Henon plots, the Mandelbrot and Julia sets and Sierpinski gaskets. You don't have to be a mathematical genius to create images. Analytic's creators emphasized composition and colors rather than computation. Three utilities let you elaborate on work produced with this or any other graphics program. Spheres maps art onto spheres or ellipsoids, while Gallery enables you to add effects such as color animation and evolution. The 3-D program puts your creations into any 3-D perspective view, and gives you the option of color-driven Z heights. You can purchase a copy of the program from Crystal Rose Software for $64.35 (including shipping). Contact them at 109 S. Los Robles Avenue, Pasadena, CA 91101-2417, 818/795-6664.

GETTING BETTER ALL THE TIME

The latest AmigaDOS C compiler upgrade from Lattice is here. With its in-line interface to all Amiga ROM functions, **Version 4.0** supports 16- and 32-bit integers and reduces subroutine calls with its built-in ANSI functions, which are among over 250 functions included in the expanded library. Blink has also been upgraded, and now provides an option to aid debugging, true overlay support and the ability to pre-link unchanging modules. Lattice includes Blink and an assembler compatible with all Amiga syntax along with the compiler. The compiler is priced at $200; the upgrade price is $75, but you will not be charged if you purchased your program after August 1, 1987. Compile your questions and direct them to Lattice, 2500 South Highland Avenue, Lombard, IL 60148, 312/916-1600.

TWO PARTS TO BOOT

There are two parts to the new **auto-booting hard-drive system** for the Amiga 1000 from Comspec. The hard-drive chassis allows for mounting of two hard drives or a hard drive and a tape streamer, a SCSI controller board, a power supply, SCSI daisy-chain connectors and a fan. The other half, the SCSI host adaptor, provides auto-boot circuitry, a small computer systems interface port and battery backup clock. You can add new devices to the open-ended SCSI driver, and up to 10 hard drives (from 10 to 300 megabytes) to the host adaptor. The adaptor can boot Kickstart and Workbench from hard disk, and an intelligent SCSI controller chip handles many drive operation tasks, thus freeing up the CPU. In case of a media defect, the hard-disk driver software is able to automatically replace a defective block with a block from the reserved section of the disk. Comspec Communications Inc., who sells the unit for $1,495 ($1,150 for Comspec owners), may be reached at 153 Bridgeland Ave. Unit 5, Toronto, Ontario, Canada M6A 2Y6, 416/785-3553. ►



Driving duo: adaptor (connected to bus) and chassis (right).

Circle 44 on Reader Service card.

No Jeopardy Here

"I'll take complete software development systems for $249, Jack." "Okay. The answer is: 'This system provides the Modula-2 programmer with a high-speed, single-pass compiler that translates ASCII files into 68000 code, and compiler support of many Amiga-specific features. The editor reports errors in plain text, and the linker joins compiled modules into a runnable program in seconds. Also included are all Amiga operating system definitions and many basic libraries.'" "I know! 'What is the **M2 Amiga**?'!" To claim your M2 Amiga, contact Interface Technologies, the US distributor; 3336 Richmond Suite 200, Houston, TX 77098, 713/523-8422.

Boards to Beef Up Memory

Computer Expansion Products has extended its line of **memory expansion boards**. To your A500 you can add an internal 512K memory and clock board (with or without RAM) and several external expansion cards, including 0–8MB and two-megabyte RAM with or without a SCSI hard-drive controller. Amiga 1000 options include two and 0–8 meg external boards and a SCSI controller either alone or with a two-megabyte expansion board. They offer three cards for the 2000—two megabyte, 0–8MB and two meg with SCSI hard drive. All boards are auto-config, offer no wait state memory access and self-contained power supplies where applicable, and may be installed by the user. Retailing between $95 and $1,495, they can be purchased from Computer Expansion Products Inc., 3596 South 300 West, #10, Salt Lake City, UT 84115, 801/264-8238.

Boxes and Blockbusters

Banking on the theory you can never have enough memory, Byte by Byte offers the **Byte Box** for the 500. The Byte Box will expand your 500's memory by up to two megabytes of zero wait state fast RAM. The memory boards are socketed with 256K DRAM chips, so you can buy an unpopulated board and enlarge it at your own pace. The companion memory-checking software alerts you of bad memory chips, bent pins and the like. The auto-config system connects to the expansion bus and has a power supply, which turns itself off when your Amiga is shut off. The Byte Box retails for $299.95 at 0K, $399.95 for 512K, $499.95 for one meg and $699.95 for two megabytes.

With all that new memory, you'll have plenty of space to experiment with **Animate 3-D**, which puts your Sculpt 3-D renderings in motion. Using a script language or graphic interface, you control object rotation, camera movements, timing and action. Your animation can include either solid modeling or ray tracing and you can link objects together for hierarchial movements. To check the results, you can play back a wire frame of your creation from a compressed animation file. Provisions also were made for single-frame VCR control and image rendering to a frame buffer card. You specify key frames per scene in a tri-view screen (similar to Sculpt 3-D); "in-betweening" for moving and rotating objects is automatic. You can metamorphose objects in shape and size, assign segmented and cubic spline paths for objects, the observer and light sources; apply velocity and motion blur to smooth curves plus enhance RAM-based animations with digitized sound. Animate 3-D sells for $149.95, but you'll need Sculpt 3-D as an object editor before you can begin creating your Emmy-winning production. Contact Byte by Byte Corp. for details, at Arboretum Plaza II, 9442 Capital of Texas Highway North, Suite 150, Austin, TX 78759, 512/343-4357.

Gargantuan Graphics

Using a standard IFF file from any Amiga graphics program, you can create larger-than-life letters and anything else (up to eight and a half feet in height) with **HUGEprint**, the multi-tasking mural printer program. HUGEprint supports any graphics printer that has an Amiga driver. You can round up a copy for the not-so-huge price of $48 (plus shipping and handling) at Hugh's Software Ranch, 50 East End Ave., New York, NY 10028, 212/879-4651.

Added Security

Whether you're a tightrope walker or you'd just like to protect your hard-disk-based data, it's nice to have a **saf-T-net** handy. Invocable from Workbench or the CLI, the utility offers as-needed automatic formatting and 907.5K of data per floppy. Balance these and its many other features with the selling price of $49.95, and then contact RSN Software Inc., 4122 South Parker Rd., Aurora, CO 80014, 303/690-0102.

Let's Hear It for Teamwork

The combined efforts of Ameristar Technologies and ASDG Inc. have yielded a package of Ethernet networking hardware for the Amiga 1000. Ameristar's **A2000 Ethernet board** (which, along with its software, allows you to link Amigas with equipment by other manufacturers) fits into one of five A2000 slots on ASDG's platform, the **2000-and-1**. The 2000-and-1 will also accommodate two A1000 boards, three IBM PC/AT cards, the A2000 86-pin CPU slot and, internally, up to three hard disk, tape or floppy drives. The ASDG 2000-and-1 backplane/Ameristar Ethernet package, priced at $1,399, discounts the price of the components purchased separately by $299. Contact Ameristar Technologies at PO Box 415, Hauppage, NY 11788, 516/698-0834. You can reach ASDG Inc. at 280 River Road Suite 54A, Piscataway, NJ 08854, 201/540-9670.

On Every Screen

A genlock for the masses, **AmiGen** from Mimetics is compatible with all Amigas and comes in both NTSC and PAL versions. Promising a NTSC RS-170A broadcast standard image, AmiGen overlays Amiga graphics on external video sources and will synchronize the Amiga's video image with any external source. For the 500, AmiGen provides composite color video output, and the RGB Thru connection allows all models to use their usual monitors with the genlock plugged in. The unit is priced at $179.95. To get in sync, aim your video cameras at Mimetics Corp., PO Box 60238 Station A, Palo Alto, CA 94306, 408/741-0117. ■

HELP KEY

Help me Help Key! Help, Help me Help Key!

Help me Help Key, yeah . . . get me out of this mess!

By Louis R. Wallace

SEE THE LIGHT

Q: *I am getting an A500 but can't afford a 2002 monitor right away. Can I use the monochrome output with a TV, or can I change the RGBA output to composite video?*

T. G.
Idyllwild, CA

A: C Ltd has developed an interface called the C-View, which is designed to convert the Amiga 500 (or 2000) RGBA signal to a standard composite video output such as that used by the C-64's 1702 composite monitor. You should also be able to use it with a monitor-type TV that is equipped with composite video input connections. Or, you could run it into a VHS player and then out to a TV. C-View's retail price is $49.95, about the same price as a monochrome composite monitor, which is what the monochrome output was designed for.

Commodore supposedly has an Amiga RF modulator for the A500 called the A520, but I haven't been able to find any details on it.

UNKNOWN FORMAT

Q: *As a new A500 owner I have been trying to learn the CLI using* AmigaWorld *articles and* The AmigaDOS Manual, 2nd Edition. *Since I have only one drive, I copy the C directory to RAM, then assign C: to RAM using ASSIGN. Everything works fine, except FORMAT, which prompts an Unknown Command message! I have looked in the C directory and it isn't there, nor is there a command called INITIALIZE. Where the heck is the format command? Is it in ROM? If so, why doesn't it work from the RAMDISK?*

S. Forstein
Sioux Falls, SD

A: Your problem is the result of a discrepancy between the version 1.1 and 1.2 AmigaDOS disks. On the earlier AmigaDOS disks, FORMAT was indeed in the C directory. In the new systems, it has been given an icon and moved to the SYSTEM directory. It now can be used either from the CLI or Workbench. From the CLI, type: SYSTEM/FORMAT DRIVE DF0: NAME "diskname" (the DF0: can be any drive). If you want to have it in RAM, just copy it over into your RAMDISK resident C directory.

CIRCUITOUS SIMULATIONS

Q: *I am an electronics teacher at a technical institute in Milan, Italy. I would like to use my A1000 for designing and simulating analog circuits. Is there an analog circuit simulator program available?*

P. Castellotti
Milan, Italy

A: At this writing, there is no software available for simulating an analog circuit. LogicWorks, the only circuit simulation software I know of, is strictly for digital circuits. LogicWorks is available for $299.95 from Capilano Computing, PO Box 86971, North Vancouver, B.C. Canada V7L 4P6, 604/669-6343.

A GREEK GENIE

Q: *I am planning on starting a newspaper for the Greek neighborhood I live in. I would like to use Greek in the newspaper, but I am having trouble finding a font with Greek characters. Is there any public domain software that includes a set of Greek characters?*

S. Thomopoulos
New York, NY

A: On the GENIE network, Library 14 (Fonts and Icons) of the Amiga Software Exchange has many public domain fonts, including MATHFONT.ARC, which contains Greek characters. While intended as a mathematical font, perhaps it will help you. The file is less than 4K and downloads very quickly. You will need the file's number (2687) to download it and either ARC or DEARC (both are on GENIE) in order to extract it. The .ARC extension means the file consists of several different files that have been compressed and linked together to make them easier to download. Your terminal software must support XMODEM, which is the protocol used by the GENIE network for uploading and downloading.

For information on GENIE itself, dial 800/638-9636.

RAMMED FONTS

Q: *I am using the Comspec two-meg RAM board. By copying DeluxePaint II, DigiPaint, Butcher 2.0 and Digi-View into the RAM disk, I can switch between them so fast it's like they were all one giant program. Even more importantly, the loading and saving of images is speeded up dramatically. How do I install the FONT directory on the RAM disk so the graphic programs will work with it in RAM?*

D. Garon
Duluth, MN

A: All you need do is use the CLI to create a small batch file (RAMFONT, for example) that can be executed when you start up your system. Type:

```
MAKEDIR RAM:FONTS
COPY DF0:FONTS ALL
  RAM:FONTS
ASSIGN FONTS:
  RAM:FONTS
```

RAMFONT creates a duplicate of the FONTS directory in RAM, copies all your fonts to the new directory, then instructs the Amiga to use this RAM directory (via the AmigaDOS ASSIGN command) instead of the disk-based font directory. To execute these instructions, type EXECUTE RAMFONT or include them in your startup-sequence where they will execute automatically when you boot Workbench. ■

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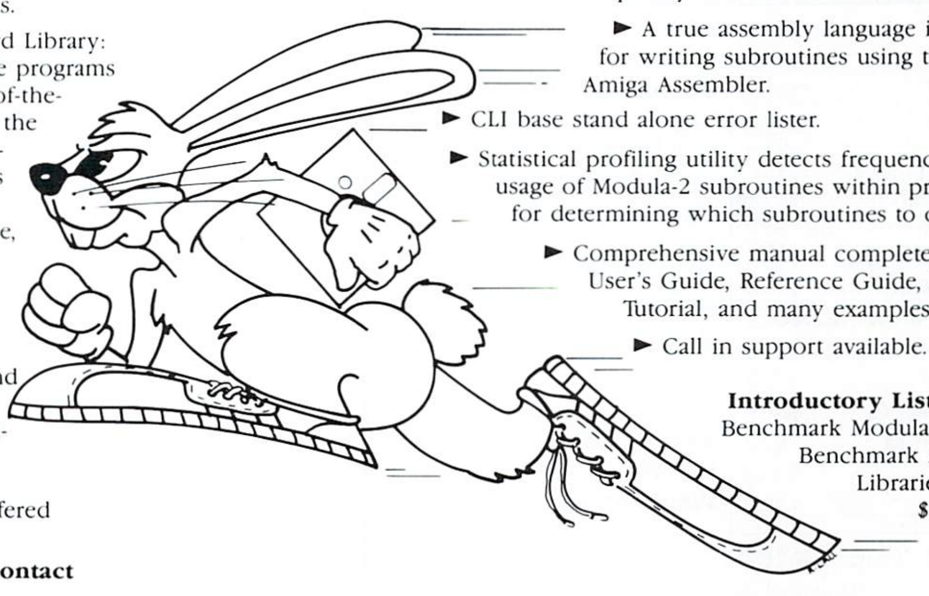
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AMIGA

Circle 8 on Reader Service card.

from p. 48

```
int ReadClip();/* Read a cut from clipboard, re- */
/* turns # bytes read. */
void CloseClip(); /* Close clipboard */
void WriteClip(); /* Write data to clipboard */
void show_buf(); /* Little hex dumper routine */
void clip_iff_str(); /* Writes string to clipboard
in IFF form Notepad can read  */
void close_up_shop(); /* Clean-up routine */
/* Main Program - no arguments */
main ()
{
char consbuf[81]; /* To read from console  */
char clipbuf [1024]; /* Up to 1K reads at a time */
int nread; /* # bytes read from clipboard */
/* Basic Scheme - Open Console, Open ClipBoard
Loop, doing:
  Get 1-character command from user- read or quit
  If quit, exit loop
  else check contents for IFF formatted text (FTXT)
    if there, print out text as ASCII
    otherwise, dump as hex data
  Pause between windowfulls
End Loop
Close up shop and quit */
/* Open graphics library so DOS can make window */
if ((GfxBase = (struct GfxBase *) OpenLibrary
  ("graphics.library", 0)) == NULL)
    {
    printf ("Can't open graphics library\n");
    exit (1);
    }
closeflags |= CL_GFXLIB;
/* Open console window to talk to user through */
   if ((cons = Open ("CON:10/90/620/100/ClipDemo",
   MODE_OLDFILE)) == 0)
   {
    printf ("Can't open a console window\n");
    close_up_shop ();
    exit (2);
   }
   closeflags = CL_CONSOLE;
   if ((clipreq = OpenClip (0)) == NULL)
   {
    Write (cons, "Open error on clipboard\n",33);
    close_up_shop ();
    exit (3);
   }
   closeflags |= CL_CLIPDEV;
   for (;;) /* Loop until inside decides to quit */
   {
    (void) Write (cons, "Next: R (read clip),
       W (write one), Q (quit) ? ", 47);
    (void) Read (cons, consbuf, 80);
       /* We really only look at first char */
    if ((*consbuf == 'q') || (*consbuf == 'Q'))
       break;
    else if ((*consbuf == 'r') || (*consbuf == 'R'))
     { /* Else we read a clip */
       nread = ReadClip (clipreq, clipbuf, 1024);
       /* And display what we read */
       show_buf (clipbuf, nread);
     }
    else if ((*consbuf == 'w') || (*consbuf == 'W'))
     { /* Get a string, write it in FTXT format. */
       Write (cons, "Enter up to 80 chars--\n> ",25);
       nread = Read (cons, consbuf, 80);
       clip_iff_str (clipreq, consbuf, nread);
     }
     else
      Write (cons, "R, W, or Q only, please!\n", 25);
   }
close_up_shop ();
exit (0);
} /* end main */
/* show_buf -
Display contents of a buffer read from the
clipboard as hex and ASCII.
Args:
```

```
  buf:     Data from clipboard.
  nbytes:  Number of bytes in buf.
Returns: Nothing.
Notes:
A better version would diagnose data to
see if was IFF FTXT which we could
display as simple ASCII. Exercise left
to the reader (I always wanted to say
that!)  See clip_iff_str for format. */
void
show_buf (buf, nbytes)
char *buf;
int nbytes;
{
int nleft;
int i,j;
char *bufptr;  /* To traverse buf */
char conbuf[60]; /* 60 char wide dump */
char *cptr; /* To write into conbuf */
int endcnt; /* Loop control */
int hinyb, lownyb; /* Nybbles of current byte we're
hexifying */
   /* Hex/ascii dump */
nleft = nbytes;
while (nleft > 0)
{
   for (i=0; i<DFLT_NLINES; i++) /* Do each line */
   {
    /* Init conbuf to blanks */
    cptr = conbuf;
    for (j=0; j<60; j++)
         *cptr++ =  ' ';
        cptr = conbuf;
        bufptr = buf;
        endcnt = min(nleft, 12); /* Twelve bytes per
          line */
        /* Hex values first */
for (j=0; j<endcnt; j++)
         {
          lownyb = (*bufptr) & 0xF;
          hinyb = (*bufptr >> 4) & 0xF;
          *cptr++ = hextab[hinyb];
          *cptr++ = hextab[lownyb];
          bufptr++; /* Next byte */
          cptr++;      /* Blank between each number */
         }
          cptr = conbuf + 39;/* blanks in-between. */
          bufptr = buf;
    /* Now output char values;
                          dots for non-printables. */
         for (j=0; j<endcnt; j++)
         {
          if ((*bufptr >= ' ') && (*bufptr <= '~'))
           *cptr = *bufptr;
          else
           *cptr = '.';
           bufptr++;
           cptr++;
         }
         *cptr++ = '\n';
         Write (cons, conbuf, (int) (cptr - conbuf));
         buf += endcnt;
         nleft -= endcnt;
         if (nleft <= 0)
         break;/* Done */
    } /* end for */
    if (nleft > 0)
    {
     Write (cons, "<Hit RETURN to see more> ", 25);
     Read (cons, conbuf, 60);  /* wait for return */
    }
} /* end while */
} /* end show_buf */
/* clip_iff_str -- Write string to clipboard in
simple IFF FTXT (formatted text) form.
Args:
  ioreq:   IOClipReq to write to.
  buf:     String for clipboard.
```

Listing continued on p. 92

from p. 91

```
  nbytes: Number of bytes in string.
Returns:  Nothing.
Notes:
The format of the clip is:
 Bytes 1-4:   "FORM"
 Bytes 5-8:   Length of string plus 12
    (length of rest of clip)
 Bytes 9-12:  "FTXT"
 Bytes 13-16: "CHRS"
 Bytes 17-20: Length of string
 Bytes 21-n:  String. */
void
clip_iff_str (ioreq, buf, nbytes)
struct IOClipReq *ioreq;
char *buf;
int nbytes;
{
long len;
if (!nbytes)/* Nothing to write */
  return;
WriteClip (ioreq, "FORM", 4, WCLIP_FIRST_WRITE);
len = nbytes + 12;
WriteClip (ioreq, &len, 4, WCLIP_CONT_WRITE);
WriteClip (ioreq, "FTXT", 4, WCLIP_CONT_WRITE);
WriteClip (ioreq, "CHRS", 4, WCLIP_CONT_WRITE);
len = nbytes;
WriteClip (ioreq, &len, 4, WCLIP_CONT_WRITE);
WriteClip (ioreq, buf, nbytes, WCLIP_LAST_WRITE);
}
/* Cleanup Routine - closes and deallocates things
based on flags set in "closeflags" */
void
close_up_shop ()
{  /* Close and terminate things in inverse order of
their opening/allocation. */
if (closeflags & CL_CLIPDEV) CloseClip (clipreq);
if (closeflags & CL_CONSOLE) Close (cons);
if (closeflags & CL_GFXLIB) CloseLibrary(GfxBase);
} /* end close_up_shop */
/* The following routines are some sample clipboard
utility i/o routines: open a clipboard device unit,
close it, read from it. */
/* OpenClip - Open a clipboard unit
Arguments:
  unit: Clipboard unit to open
Returns:
  IOClipReq struct to use for clipboard i/o
Notes: This routine does not create a "satisfy"
message port to answer satisfy messages after
doing a CMD_POST.  If your application will be
POSTing data, you should create a satisfy port
here as well to pass back to your caller. */
struct IOClipReq *
OpenClip (unit)
  int unit; /* ClipBoard unit to open */
{
register struct IOClipReq *ioreq;
   struct MsgPort *port; /* I/O msg port */
   int err_code; /* Error from OpenDevice */
   if ((ioreq = (struct IOClipReq *)
     AllocMem (sizeof (struct IOClipReq),
       MEMF_PUBLIC | MEMF_CLEAR)) == NULL)
     return (NULL);
if ((port = CreatePort (NULL, 0)) == NULL)
  {
   FreeMem (ioreq, sizeof(struct IOClipReq));
   return (NULL);
  }
if ((err_code = OpenDevice ("clipboard.device",
     unit, ioreq, 0)) != 0)
 {
  RemPort (port);
  FreeMem (ioreq, sizeof(struct IOClipReq));
  return (NULL);
 }
ioreq->io_Message.mn_ReplyPort = port;
ioreq->io_ClipID = 0; /* Make sure empty */
return (ioreq);
```

```
} /* end OpenClip */
/* CloseClip -- Close an open clipboard unit.
Arguments:
  ioreq: IOClipReq struct for clipboard
Returns: Nothing. */
void
CloseClip (ioreq)
struct IOClipReq *ioreq;
{
/* Free the associated message port, then */
/*    close the clipboard device itself.   */
CloseDevice (ioreq);
RemPort (&(ioreq->io_Message.mn_ReplyPort));
FreeMem (ioreq, sizeof(struct IOClipReq));
} /* end CloseClip */
/* ReadClip -- Read a chunk of data from an
open clipboard unit
Arguments:
  ioreq:  IOClipReq struct to read with
  buf:    Buffer to read bytes into
  bufsiz: Size of buffer.
Returns:
  Number of bytes actually read. */
int
ReadClip (ioreq, buf, bufsiz)
  register struct IOClipReq *ioreq;
char *buf;
int bufsiz;
{
int length;
/* Get clip data */
ioreq->io_Command = CMD_READ;
ioreq->io_Data = buf;
ioreq->io_Length = bufsiz-1;
    /* So we can tack on '\0' */
ioreq->io_Offset = 0;
ioreq->io_ClipID = 0; /* Always do for first read */
DoIO (ioreq);/* Read it */
length = ioreq->io_Actual;
*(buf + length) = '\0';
if (ioreq->io_Actual < (bufsiz - 1)) /* Read all */
 { /* Terminate read so other programs can write to
        clipboard again. */
   ioreq->io_Command = CMD_READ;
   ioreq->io_Length = 1;
   ioreq->io_Data = NULL;
   DoIO (ioreq); /* Clear it out */
 }
return (length);
} /* end ReadClip */
/* WriteClip -- Write a chunk of data to an open
clipboard unit
Arguments:
  ioreq: IOClipReq struct to write with
  buf:    Buffer to write out
  bufsiz: Size of buffer.
  whichone: Type of write - first, continuation, last.
Returns: Nothing. */
void
WriteClip (ioreq, buf, bufsiz, whichone)
  register struct IOClipReq *ioreq;
char *buf;
int bufsiz;
int whichone;
{
/* Write clip data */
if (whichone == WCLIP_FIRST_WRITE)
{
   ioreq->io_Offset = 0;
   ioreq->io_ClipID = 0; /* Always do for first write */
}
ioreq->io_Command = CMD_WRITE;
ioreq->io_Data = buf;
ioreq->io_Length = bufsiz;
DoIO (ioreq);      /* Write it to clipboard */
if (whichone == WCLIP_LAST_WRITE)
{
   ioreq->io_Command = CMD_UPDATE;
   DoIO (ioreq);
}
} /* end WriteClip */ ■
```


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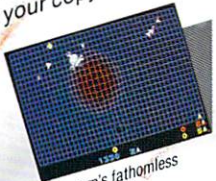
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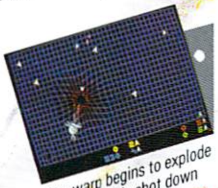
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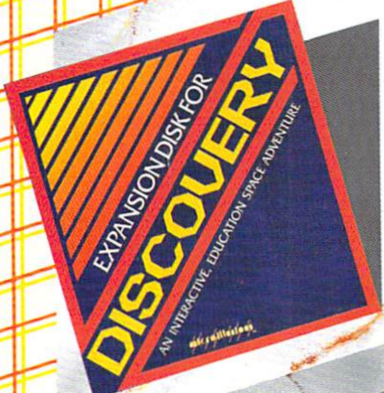
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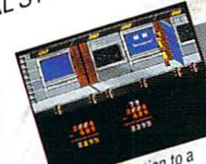
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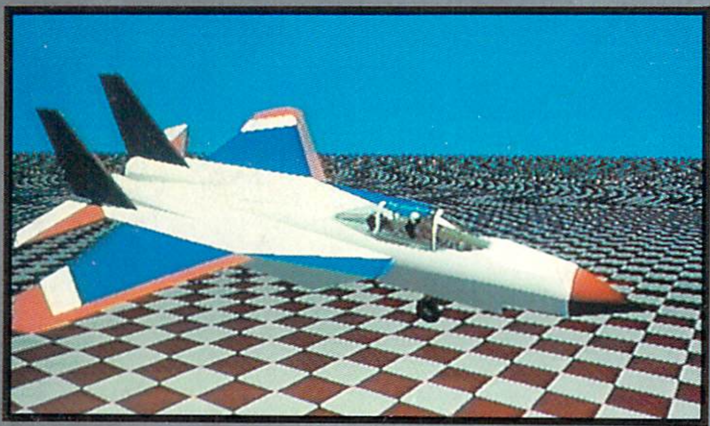
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